

**CH2MHILL**

**CH2M HILL**

1748 West Truck Road  
Otis ANGB, MA 02542

31 March 2010

Mr. Jonathan S. Davis  
Remediation Program Manager  
HQ AFCEE/MMR  
322 E. Inner Road  
Otis ANG Base, MA 02542-5028

SUBJECT: AFCEE 4P08 FA8903-08-D-8769; Task Order 0148  
MMR SPEIM/LTM/O&M Program  
CDRL #A0011  
**Fuel Spill-28 2009 Summary Letter Report**

Dear Mr. Davis:

The purpose of this Summary Letter Report (SLR) is to document the results of sampling activities conducted at the Fuel Spill-28 (FS-28) plume under the System Performance and Ecological Impact Monitoring (SPEIM) program during the 2009 calendar year. This deliverable contains no detailed assessment or evaluation of the results, but is a means of documenting all the actions completed under the FS-28 SPEIM program. The data collected under the SPEIM program are continually assessed and the results of these assessments are presented initially during the Technical Update Meetings and then through Technical Memoranda or Project Note deliverables, if warranted, based on the results of the data evaluation or to address particular plume issues.

This letter report includes a summary of the activities performed and the data collected for the FS-28 SPEIM program between 01 January 2009 and 31 December 2009. The FS-28 plume is defined as the extent of groundwater contaminated with ethylene dibromide (EDB), the FS-28 plume contaminant of concern (COC), at concentrations exceeding the Massachusetts Maximum Contaminant Level (MMCL) of 0.02 micrograms per liter ( $\mu\text{g/L}$ ). The FS-28 extraction, treatment, and discharge (ETD) system was designed to treat a maximum of 750 gallons per minute (gpm). At the time of system startup on 14 October 1997, the ETD system consisted of one extraction well (69EW0001) with the goal of remediating the northern portion of the plume. On 06 April 1999, the remedial system was expanded with the startup of the shallow wellpoint (SWP) system which consists of an array of 204 wellpoints. The SWP system was installed to intercept shallow EDB contaminated groundwater before it discharges to the Coonamessett River or associated cranberry bogs. During 2007, the FS-28 ETD system was further expanded through the installation of a second extraction well (69EW0002) to remediate a deeper leading edge lobe of the plume identified to the south of both 69EW0001 and the SWP system. Extraction well 69EW0002 came on-line on 11 December 2007. During 2009, the FS-28 ETD system operated at a total flow rate of 600 gpm; 550 gpm extracted at 69EW0001 and 50 gpm at 69EW0002. On 07 November 2008, the SWP system was shutdown for an interim period while data gap investigative

activities were being conducted (AFCEE 2009a). The outcome of the data gap investigation and associated optimization evaluation concluded that although the SWP system had been successful in remediating the FS-28 plume in this area, it is no longer effective in remediating the remaining residual EDB contamination near the SWPs and consequently the system has been permanently shutdown (AFCEE 2010a).

The extracted water is conveyed to the FS-28 treatment plant where it is treated by a granular activated carbon system and discharged to the Coonamessett River via two vertical riser pipes (i.e., bubblers). The FS-28 plume and treatment system are presented in [Figure 1](#).

The Air Force Center for Engineering and the Environment (AFCEE) installed the FS-28 ETD system (including 69EW0001 and the SWP system) under time critical and non-time critical actions which became the selected alternative in the Final Record of Decision (ROD) (AFCEE 2000). The FS-28 remedial system has been modified since the ROD was signed in 2000 through the addition of extraction well 69EW0002 in 2007. This modification was not considered significant since the modifications were consistent with the cleanup strategy outlined in the ROD (AFCEE 2008a). A Final Explanation of Significant Differences (ESD) was submitted in September 2008 to: (1) document the planned land use control process at FS-28; and (2) update the three-step process (AFCEE 2008a).

## **FS-28 SPEIM ACTIVITIES**

The SPEIM program was developed to monitor plume changes and to ensure the effective operation of the AFCEE groundwater remediation systems at Massachusetts Military Reservation (MMR). These objectives are met through monitoring of selected media (i.e., groundwater, surface water) within and outside the plume boundaries, treatment plant monitoring, and groundwater flow and transport modeling. Activities completed for the FS-28 SPEIM program during 2009 include the following:

### **SPEIM Sampling Activities:**

- Triennial, annual, and semiannual (March through June 2009) and semiannual (August 2009) groundwater sampling.
- Surface water sampling at the Coonamessett River during the cranberry growing season (May 2009 through September 2009).
- Seasonal (May 2009 and July 2009) recreational beach surface water sampling.
- Quarterly sampling of the Coonamessett Water Supply Well (CWSW) sentry wells (January 2009, April 2009, July 2009, and October 2009).
- Monthly treatment plant sampling (January 2009 through December 2009).
- Recording of daily average treatment system flow rates (January 2009 through December 2009).
- Baseline sampling of two newly installed monitoring wells (69MW0033A and 69MW0034A) in June 2009 to monitor the attenuation of remnants of the FS-28 plume in the vicinity of the SWP system ([Figure 2](#)). These two monitoring wells were added to the FS-28 SPEIM chemical network for annual monitoring for EDB (AFCEE 2010a).

- Residential well sampling (April and July 2009).
- No hydraulic monitoring was needed at FS-28 during 2009.

Groundwater and surface water locations sampled for the FS-28 SPEIM program in 2009 are presented in [Figure 2](#) and [Figure 3](#), respectively. The well construction and surface water location information is included in [Table 1](#). The current approved FS-28 SPEIM network is presented in the *Comprehensive Long Term Monitoring Plan*, which is available on-line at [www.mmr.org](http://www.mmr.org) under Plans and Protocols.

Groundwater analytical results are presented in [Table 2](#). [Table 3](#) contains the surface water analytical results. A map showing the distribution of EDB detections in groundwater in 2009 is included as [Figure 4](#). A comparison of all compounds detected during 2009 in groundwater, surface water, and treatment plant samples to applicable standards is included in [Attachment A](#).

#### **Drilling and Direct Push Activities:**

- Installation of two direct push vertical profile borings (69DP0148 and 69DP0149) between December 2008 and January 2009 as part of a data gap investigation near the SWP system.
- Installation of monitoring well 69MW0033A (at the location of direct push boring 69DP0147 [AFCEE 2009b]) and monitoring well 69MW0034A (at the location of direct push boring 69DP0149) in February 2009 and April 2009, respectively.
- Installation of one direct push vertical profile boring (69MW0032B) south of extraction well 69EW0002 to assess the remedial performance of this extraction well. Monitoring well 69MW0032B was installed in April 2009.

The drilling and sampling locations are depicted on [Figure 2](#) and the vertical profile groundwater data for 69DP0148, 69DP0149, and 69MW0032B are presented in [Table 2](#). Well construction diagrams for 69MW0032B, 69MW0033A, and 69MW0034A are included in [Attachment B](#).

#### **Data Summary Report:**

The data summary reports for the analytical data reported in this SLR are included in [Attachment C](#). [Attachment C](#) also includes a Corrective Action Report associated with the reporting of EDB data collected between June and August 2009. It was determined that the analytical laboratory was not reporting EDB detections at estimated concentrations below the reporting limit for some of the samples. The affected EDB results were corrected and re-reported by the laboratory. This EDB reporting issue had no impact on the decision making process under the SPEIM/Operations and Maintenance Program at FS-28. A summary of the affected data and project impacts is provided in Table 1 of the Corrective Action Report.

#### **Presentations:**

Presentations for the FS-28 plume are listed in [Table 4](#).

### **Project Note Submittals:**

The project notes related to activities conducted for the FS-28 plume under the SPEIM program in 2009 are included in [Attachment D](#).

### **Report Submittals:**

- *Fuel Spill-28 2008 Summary Letter Report* (March 2009).
- Quarterly data transmittal of the monitoring results for the Coonamessett Water Supply Well sentry wells (February 2009, May 2009, August 2009, and November 2009).

### **Major Events and Optimizations:**

Optimization activities are completed as part of the SPEIM program in order to improve the performance of the remedial systems and to improve the monitoring program. During 2009, an optimization evaluation of the FS-28 ETD system that was initiated in 2008 was completed (AFCEE 2009a). This optimization effort resulted in: 1) a new operational configuration for 69EW0001 (maintain a flow rate of 550 gpm while shortening the extraction well screen such that groundwater is extracted from bottom 20 feet of well screen) that was implemented on 11 June 2009; 2) establishing a final design flow rate for 69EW0002 of 50 gpm, and 3) shutdown of the SWP system (AFCEE 2009a, 2010a).

In December 2009, results of an optimization evaluation for the Coonamessett Water Supply Well (CWSW) sentry well monitoring program were presented to the regulatory agencies at a technical update meeting. Based on the monitoring data collected to date, it was recommended that the quarterly sampling program at two monitoring wells should be reduced to annual sampling of the deeper sentry well (69MW1279C). Regulatory concurrence on this optimization was obtained in February 2010 (AFCEE 2010b) and the project note documenting this optimization evaluation is included in [Attachment D](#).

### **FS-28 REMEDIAL STATUS UPDATE**

Analytical results for samples collected at the FS-28 treatment system are presented in [Table 5](#). Average weekly flow rates for the FS-28 extraction wells are presented in [Table 6](#). Treatment system operational downtimes or deviations (for events lasting two hours or longer) between January 2009 and December 2009 are summarized in [Table 7](#). Mass removal calculations through December 2009 for the FS-28 treatment system are presented in [Table 8](#).

The most recent plume shell for the FS-28 plume included data collected through June 2006 (AFCEE 2007). The 2006 FS-28 EDB plume shell is estimated to contain approximately 1.8 billion gallons of contaminated groundwater and 4.8 pounds (lbs) of dissolved-phase EDB at concentrations above the MMCL.

The FS-28 ETD system removed approximately 0.37 lbs of EDB between January 2009 and December 2009. During this period, approximately 298 million gallons of groundwater were treated at the FS-28 plant. Since system startup in October 1997, the system has removed approximately 14.16 lbs of EDB through the treatment of approximately 4.3 billion gallons of groundwater.



The operation of the FS-28 remedial system used approximately 402 megawatt hours of electricity during 2009. Power plant air emissions associated with this power generation for 2009 and since system startup in October 1997 are presented in [Table 9](#). Green energy purchases and power production from the 1.5 megawatt wind turbine, which started operation on 02 December 2009, are incorporated into these air emissions data.

The FS-28 remedial system is currently operating according to the 2009 Scenario 01 pumping configuration (AFCEE 2010a); 69EW0001 at 550 gpm, 69EW0002 at 50 gpm, and the SWPs off. Groundwater transport modeling conducted in 2004 indicates that EDB at concentrations above the MMCL will be present in the main body of the FS-28 plume (i.e., north of 69EW0001) through approximately 2047 (AFCEE 2004). It should be noted that the FS-28 plume shell was not updated during 2009 and that groundwater transport modeling was not performed during 2009. Furthermore, due to the complexity of the hydrogeology in the area of the leading edge lobes (south of 69EW0001), the groundwater model will not be used to assess the fate and transport of this portion of the FS-28 plume. Rather, monitoring data collected under the SPEIM program will be used to evaluate the cleanup of this lobe. Through the SPEIM program, remedial system operation is continuously evaluated and optimized to reduce cleanup times, therefore the predicted timeframes presented in this section will most likely be decreased in future scenarios.

### **FS-28 SPEIM ACTIVITIES PLANNED FOR 2010**

Activities currently planned for the FS-28 SPEIM program for 2010 include the following:

- Annual (January/February 2010) and semiannual (August 2010) groundwater sampling.
- Annual sampling of the CWSW sentry well (October 2010).
- Coonamessett River surface water and irrigation system sampling during the 2010 cranberry growing season (May through September).
- Monitoring network optimization evaluation (when appropriate)
- Synoptic water level measurements (as needed).
- Recreational beach sampling (May 2010 and July 2010).
- FS-28 SPEIM data presentations (as necessary).
- Monthly treatment system sampling (January 2010 through December 2010).
- Recording of daily average treatment system flow rates (January 2010 through December 2010).
- Land use control private well verification surveys and sampling (as needed).

Mr. Jon Davis is the Air Force point of contact for this project and can be reached at (508) 968-4670, extension 4952.

Sincerely,

CH2M HILL



Patricia de Groot, P.G.  
Program Manager

Attachments:

<a href="#">Figure 1</a>	FS-28 Groundwater Plume and Treatment System
<a href="#">Figure 2</a>	FS-28 Chemical Monitoring Locations - Groundwater
<a href="#">Figure 3</a>	FS-28 Chemical Monitoring Locations - Surface Water
<a href="#">Figure 4</a>	FS-28 2009 Ethylene Dibromide Detections in Groundwater
<a href="#">Table 1</a>	FS-28 Well Construction and Surface Water Sampling Location Information
<a href="#">Table 2</a>	FS-28 Groundwater Monitoring Results
<a href="#">Table 3</a>	FS-28 Surface Water Monitoring Results
<a href="#">Table 4</a>	FS-28 Meeting Presentations
<a href="#">Table 5</a>	FS-28 Treatment Plant Sampling Results
<a href="#">Table 6</a>	FS-28 Treatment System Flow Rates
<a href="#">Table 7</a>	FS-28 Treatment System Downtime Summary
<a href="#">Table 8</a>	FS-28 Treatment System Mass Removal Summary
<a href="#">Table 9</a>	FS-28 Remedial System Electrical Consumption and Associated Air Emissions
<a href="#">Attachment A</a>	Comparison of Detected Concentrations in FS-28 Groundwater, Surface Water, and Treatment Plant Samples to Applicable Groundwater and Surface Water Standards
<a href="#">Attachment B</a>	Well Construction Diagrams
<a href="#">Attachment C</a>	FS-28 2009 SLR Data Summary Reports
<a href="#">Attachment D</a>	FS-28 Project Notes

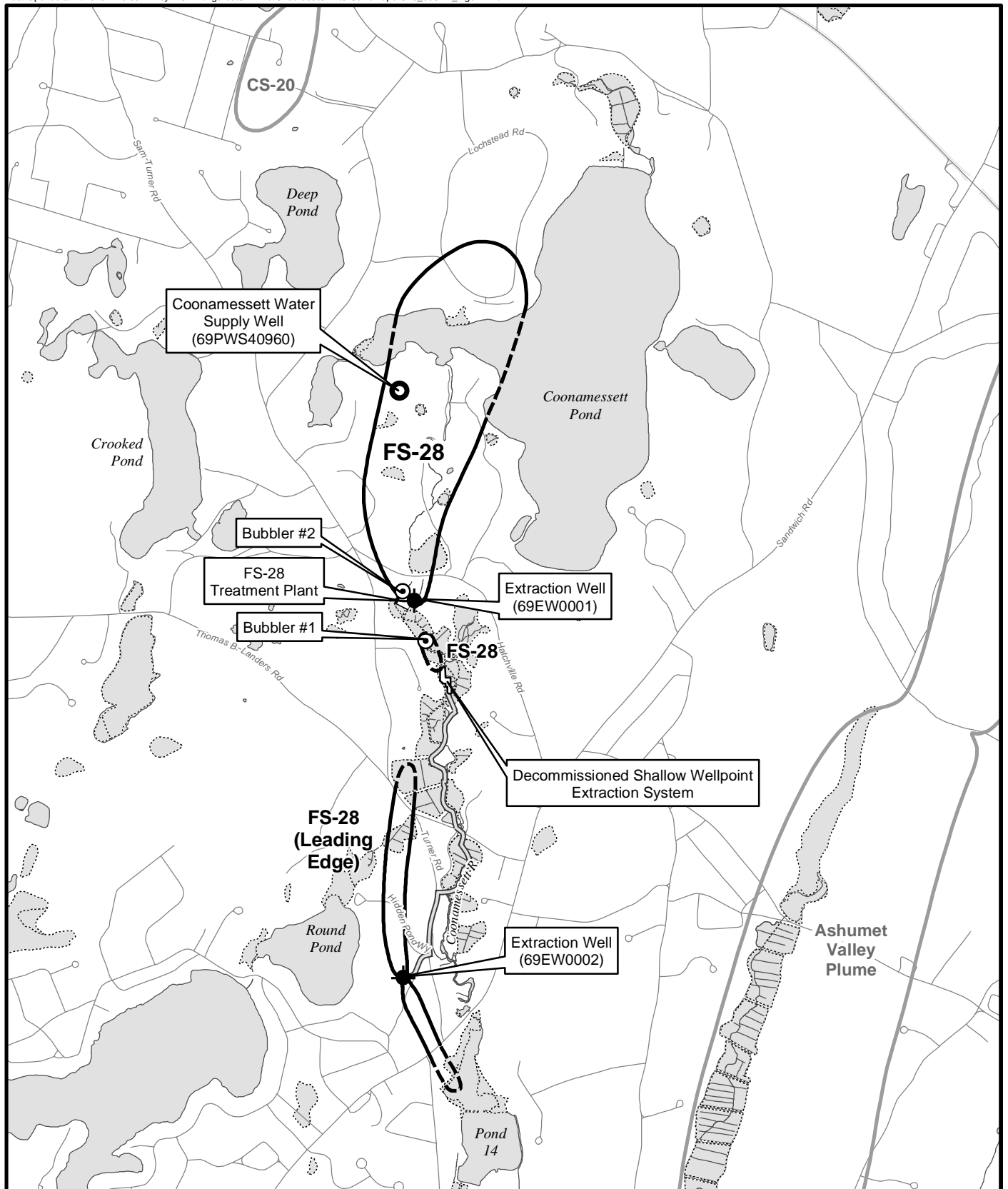
* c: Rose Forbes, AFCEE/MMR	Heather Harper, Town of Falmouth
Mike Minor, AFCEE/MMR	Camile Romano
Leticia Walton, AFCEE/ACR	Martha Steele, DPH
Paul Marchessault, EPA	Fred Bottomly
Peter Golonka, GF	David Nolte, Decas Cranberry Products
Leonard Pinaud, MassDEP	Virginia Valiela, Town of Falmouth
James Quin, Aerostar Environmental	Brian Handy, Handy Cranberry Trust
David Carignan, LBH	Jeff LaFleur, CCCGA
Steve Hurley, MDFW	CH2M HILL Document Control & Distribution
Mark Kasprzyk, Cons. Comm.	

\* Delivery via email notifying recipients of availability of electronic document at [www.mmr.org](http://www.mmr.org).

**REFERENCES**

- AFCEE. 2010a (February). Project Note: *Fuel Spill-28 2009 Triennial SPEIM Data Presentation*. 389849-SPEIM-FS28-PRJNOT-001. Prepared by CH2M HILL for AFCEE/MMR, Installation Restoration Program, Otis Air National Guard Base, MA.
- \_\_\_\_\_. 2010b (February). Project Note: *Coonamessett Water Supply Well Sentry Well Sampling Optimization*. 389849-SPEIM-FS28-PRJNOT-002. Prepared by CH2M HILL for AFCEE/MMR, Installation Restoration Program, Otis Air National Guard Base, MA.
- \_\_\_\_\_. 2009a (March). Project Note: *Fuel Spill-28 Extraction, Treatment, and Discharge System and SPEIM Network Optimization*. 371335-SPEIM-FS28-PRJNOT-002. Prepared by CH2M HILL for AFCEE/MMR, Installation Restoration Program, Otis Air National Guard Base, MA.
- \_\_\_\_\_. 2009b (March). *Fuel Spill-28 2008 Summary Letter Report*. 371335-SPEIM-FS28-SLR-001. Prepared by CH2M HILL for AFCEE/MMR, Installation Restoration Program, Otis Air National Guard Base, MA.
- \_\_\_\_\_. 2008a (September). *Final Explanation of Significant Differences for Chemical Spill-4, Chemical Spill-21, Fuel Spill-13, Fuel Spill-28 and Fuel Spill-29 Groundwater Plumes*. A4P-J23-35BC24VC-M26-0006. Prepared by Jacobs Engineering Group Inc. for AFCEE/MMR, Installation Restoration Program, Otis Air National Guard Base, MA.
- \_\_\_\_\_. 2007 (February). Project Note: *FS-28 2006 EDB Plume Shell Update*. 337105-SPEIM-FS28-PRJNOT-003. Prepared by CH2M HILL for AFCEE/MMR, Installation Restoration Program, Otis Air National Guard Base, MA.
- \_\_\_\_\_. 2004 (December). *Final Fuel Spill-28 2004 System Performance and Ecological Impact Monitoring Report*. 187615-SPEIM-FS-28-ANRPT-002. Prepared by CH2M HILL for AFCEE/MMR, Installation Restoration Program, Otis Air National Guard Base, MA.
- \_\_\_\_\_. 2000 (October). *Final Record of Decision for the Fuel Spill-28 and Fuel Spill-29 Plumes*. AFC-J23-35Q86101-M26-0009. Prepared by Jacobs Engineering Group Inc. for AFCEE/MMR, Installation Restoration Program, Otis Air National Guard Base, MA.

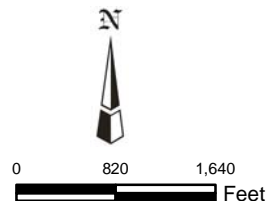
## **FIGURES**



### Legend

- |  |                          |  |  |
|--|--------------------------|--|--|
|  | Extraction Well          |  | Plume Boundary (Dashed Where Inferred)       |
|  | Public Water Supply Well |  | Other Plume Boundary (Dashed Where Inferred) |
|  | Bubbler                  |  | 69EW0002 Pipeline                            |
|  | Bog/Wetland              |  |  |

Data Source: AFCEE, February 2010, MMR-AFCEE Data Warehouse



### FIGURE 1

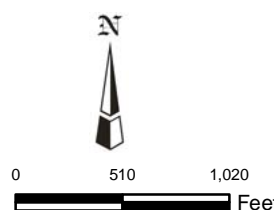
## FS-28 GROUNDWATER PLUME AND TREATMENT SYSTEM

AFCEE - Massachusetts Military Reservation  
FS-28 2009 Summary Letter Report

**CH2MHILL**

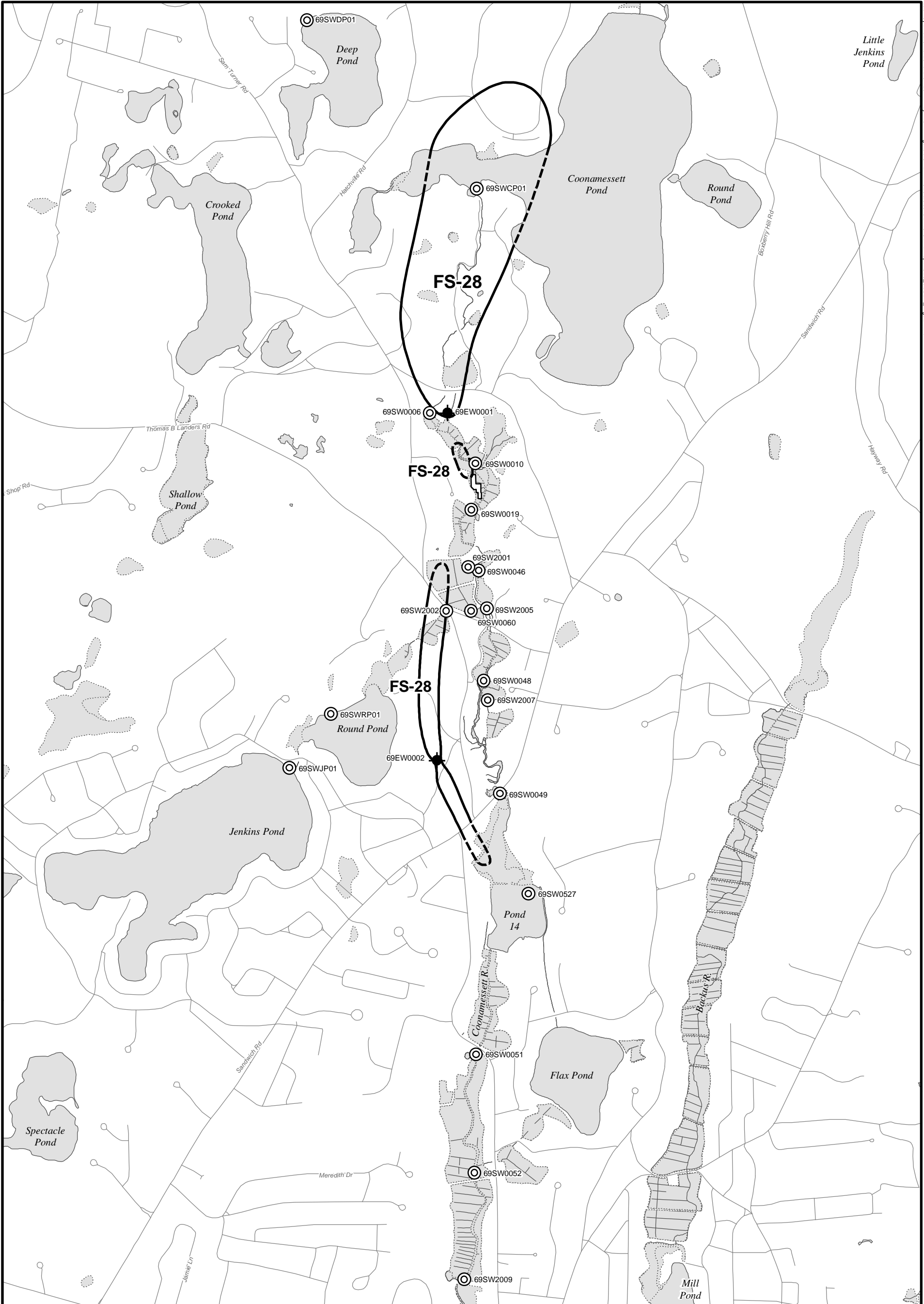
Legend

- |   |                          |   |   |
|---|--------------------------|---|---|
|  | Monitoring Well          |  | Shallow Wellpoints                        |
|  | Piezometer               |  | Plume Boundary<br>(Dashed Where Inferred) |
|  | Public Water Supply Well |  | Bog/Wetland                               |
|  | Direct Push Location     |   |   |
|  | Extraction Well          |   |   |



**FS-28 CHEMICAL MONITORING  
LOCATIONS - GROUNDWATER**  
AFCEE - Massachusetts Military Reservation  
*FS-28 2009 Summary Letter Report*





Data Source: AFCEE, February 2010, MMR-AFCEE Data Warehouse

**Legend**

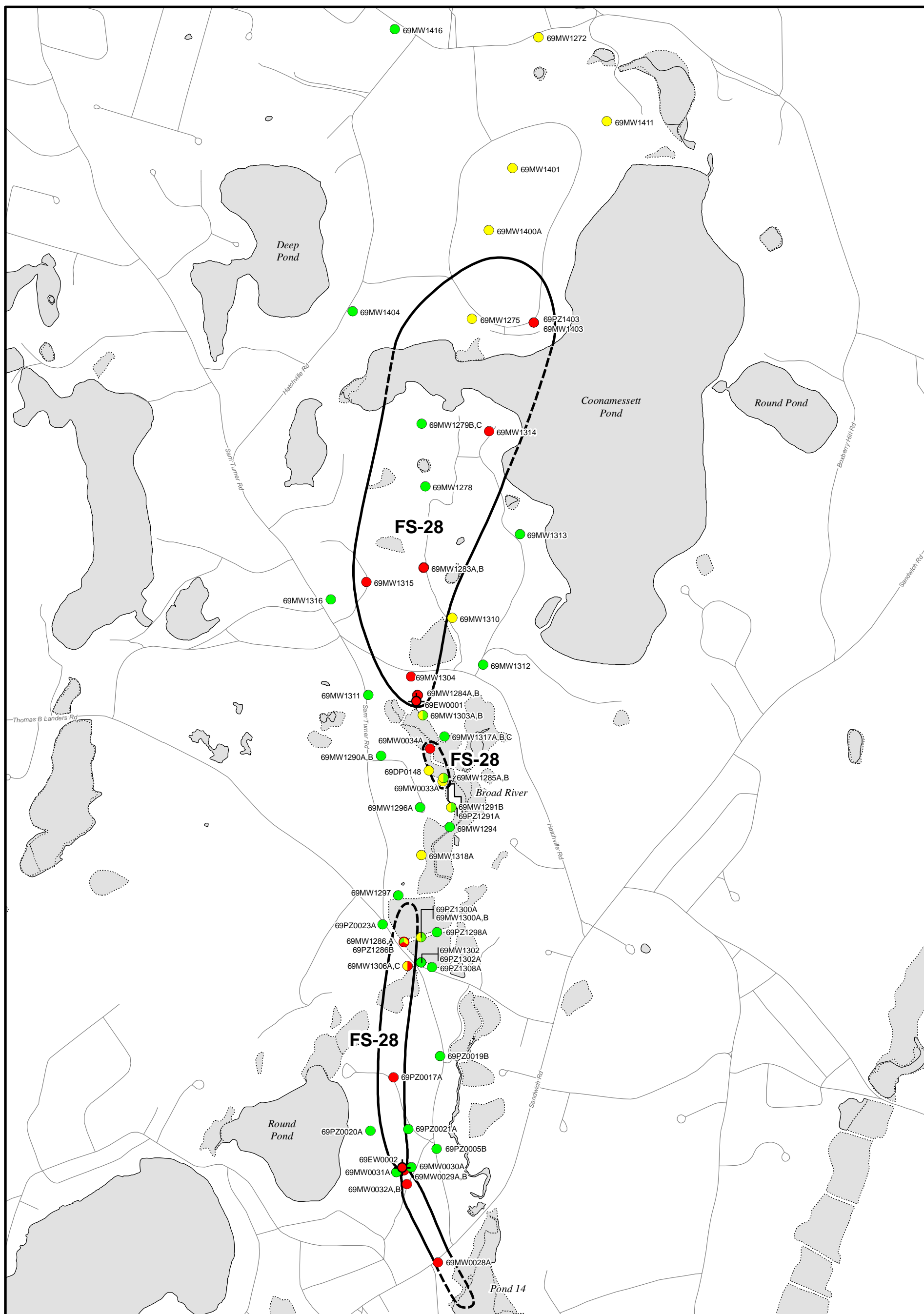
- Extraction Well
- Surface Water Sample Location
- Plume Boundary (Dashed Where Inferred)
- Bog/Wetland

**FIGURE 3**

**FS-28 CHEMICAL MONITORING LOCATIONS - SURFACE WATER**

AFCEE - Massachusetts Military Reservation  
FS-28 2009 Summary Letter Report





### Legend

Data Source: AFCEE, February 2010, MMR-AFCEE Data Warehouse



Extraction Well

Plume Boundary  
(Dashed Where Inferred)

Bog/Wetland

### Contaminant Detections in Groundwater:



### Detection Above MMCL



Detection Below or At MMCL



No Detection



**FIGURE 4**

## FS-28 2009 ETHYLENE DIBROMIDE DETECTIONS IN GROUNDWATER

AFCEE - Massachusetts Military Reservation  
FS-28 2009 Summary Letter Report

**CH2MHILL**

## **TABLES**

**Table 1**  
**FS-28 Well Construction and Surface Water Sampling Location Information**  
**FS-28 2009 Summary Letter Report**

Location	Northing (ft)	Easting (ft)	Surface Elevation (ft msl)	Measuring Point Elevation (ft msl)	Total Well Depth (ft bgs)	Top Screen Elevation (ft msl)	Bottom Screen Elevation (ft msl)	Screen Length (ft)
69DP0148	223601	853346	26	N/A <sup>1</sup>	210	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A <sup>1</sup>
69DP0149	223806	853359	27	N/A <sup>1</sup>	240	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A <sup>1</sup>
69EW0001	224250	853233	31	30.32	207	-149.22	-169.55	20.33*
69EW0002	219893	853102	40	33.85	302	-132.10	-148.10	16
69MW0028A	219006	853432	28	27.47	207	-66.99	-71.99	5
69MW0029A	219866	853116	39	38.95	171	-126.56	-131.56	5
69MW0029B	219867	853121	39	39.21	136	-89.85	-94.85	5
69MW0030A	219894	853183	39	38.74	131	-86.27	-91.27	5
69MW0031A	219848	853042	40	40.12	268	-114.32	-119.32	5
69MW0032A	219738	853143	47	46.14	260	-126.28	-131.28	5
69MW0032B	219743	853144	46	45.91	255	-93.59	-98.59	5
69MW0033A	223500	853476	28	27.53	26	7.92	2.92	5
69MW0034A	223807	853367	29	28.34	148	-111.90	-116.90	5
69MW1272	230454	854371	54	53.91	103	-43.79	-48.79	5
69MW1275	227823	853750	43	42.48	126	-78.24	-83.24	5
69MW1278	226256	853313	39	39.39	152	-107.81	-112.81	5
69MW1279B	226843	853279	47	47.24	135	-58.00	-63.00	5
69MW1279C	226842	853287	47	49.12	155	-102.99	-107.99	5
69MW1283A	225500	853301	37	38.13	185	-135.50	-138.50	3
69MW1283B	225494	853297	36	38.46	261	-183.60	-188.60	5
69MW1284A	224304	853243	32	33.44	225	-177.50	-182.50	5
69MW1284B	224309	853238	32	33.80	278	-213.40	-218.40	5
69MW1285A	223533	853482	28	30.44	68	-31.90	-36.90	5
69MW1285B	223537	853484	28	30.49	205	-151.80	-156.80	5
69MW1286	221997	853115	28	27.19	195	-152.50	-157.50	5
69MW1286A	221996	853110	28	27.20	209	-99.74	-104.74	5
69MW1290A	223740	852899	59	59.08	294	-175.60	-180.60	5
69MW1290B	223739	852899	59	59.08	294	-229.60	-234.60	5
69MW1291B	223258	853555	29	28.52	198	-125.90	-130.90	5
69MW1294	223074	853542	24	28.09	200	-15.80	-20.80	5
69MW1296A	223257	853264	38	37.98	280	-141.15	-146.15	5
69MW1297	222436	853062	30	29.22	213	-115.40	-120.40	5
69MW1300A	222044	853273	26	25.79	33	1.20	-3.80	5
69MW1300B	222043	853269	26	25.52	180	-73.90	-78.90	5
69MW1302	221809	853273	27	26.35	190	-73.30	-78.30	5
69MW1303A	224117	853292	31	30.68	278	-171.80	-176.80	5
69MW1303B	224123	853284	31	30.94	278	-211.60	-218.30	7
69MW1304	224480	853179	35	36.84	273	-178.50	-183.50	5
69MW1306A	221775	853148	26	28.38	245	-79.24	-84.24	5
69MW1306C	221772	853145	26	25.48	147	-115.27	-120.27	5
69MW1310	225029	853565	33	34.91	263	-197.20	-207.20	10
69MW1311	224307	852781	61	60.97	285	-169.00	-174.00	5
69MW1312	224590	853854	44	44.22	250	-150.59	-155.59	5
69MW1313	225810	854197	71	70.58	270	-144.09	-149.09	5
69MW1314	226772	853909	70	70.03	300	-204.63	-209.63	5
69MW1315	225364	852764	59	59.03	300	-173.70	-178.70	5
69MW1316	225201	852431	52	51.61	273	-188.05	-193.05	5
69MW1317A	223919	853494	31	30.22	245	-139.44	-144.44	5
69MW1317B	223931	853501	31	30.34	146	-108.23	-113.05	5
69MW1317C	223920	853499	31	30.22	93	-57.20	-62.20	5
69MW1318A	222810	853276	28	27.03	220	-127.48	-132.48	5
69MW1400A	228652	853906	46	45.40	241	-104.37	-109.37	5
69MW1401	229230	854128	48	47.16	221	-107.32	-112.32	5
69MW1403	227788	854325	62	61.84	264	-152.94	-157.94	5

**Table 1**  
**FS-28 Well Construction and Surface Water Sampling Location Information**  
**FS-28 2009 Summary Letter Report**

Location	Northing (ft)	Easting (ft)	Surface Elevation (ft msl)	Measuring Point Elevation (ft msl)	Total Well Depth (ft bgs)	Top Screen Elevation (ft msl)	Bottom Screen Elevation (ft msl)	Screen Length (ft)
69MW1404	227893	852635	68	67.16	298	-37.35	-42.35	5
69MW1411	229668	855009	89	87.97	258	-131.42	-136.42	5
69MW1416	230528	853029	77	76.69	236	-42.92	-47.92	5
69PZ0005B	220066	853420	26	25.78	46	-13.95	-18.95	5
69PZ0017A	220736	853018	46	45.60	186	-131.28	-136.28	5
69PZ0019B	220933	853452	28	27.46	48	-10.23	-15.23	5
69PZ0020A	220237	852802	64	63.44	182	-112.72	-117.72	5
69PZ0021A	220251	853154	34	34.13	162	-122.41	-127.41	5
69PZ0023A	222164	852914	35	34.34	176	-135.55	-140.55	5
69PZ1286B	221997	853115	27	27.11	100	-67.54	-72.54	5
69PZ1291A	223262	853552	29	28.83	15	19.03	14.03	5
69PZ1298A	222092	853423	27	26.20	20	11.56	6.56	5
69PZ1300A	222044	853273	26	25.79	20	11.16	6.16	5
69PZ1302A	221808	853273	27	26.35	20	11.66	6.66	5
69PZ1308A	221764	853376	27	26.51	15	17.11	12.11	5
69PZ1403	227788	854325	62	61.90	264	-92.94	-97.94	5
69SW0006	224248	853012	N/A	N/A	N/A	N/A	N/A	N/A
69SW0010	223613	853584	N/A	N/A	N/A	N/A	N/A	N/A
69SW0019	223033	853534	N/A	N/A	N/A	N/A	N/A	N/A
69SW0046	222272	853626	N/A	N/A	N/A	N/A	N/A	N/A
69SW0048	220889	853688	N/A	N/A	N/A	N/A	N/A	N/A
69SW0049	219473	853890	N/A	N/A	N/A	N/A	N/A	N/A
69SW0051	216204	853589	N/A	N/A	N/A	N/A	N/A	N/A
69SW0052	214723	853573	N/A	N/A	N/A	N/A	N/A	N/A
69SW0060	221766	853529	N/A	N/A	N/A	N/A	N/A	N/A
69SW0527	218217	854248	N/A	N/A	N/A	N/A	N/A	N/A
69SW2001	222314	853493	N/A	N/A	N/A	N/A	N/A	N/A
69SW2002	221764	853216	N/A	N/A	N/A	N/A	N/A	N/A
69SW2005	221795	853726	N/A	N/A	N/A	N/A	N/A	N/A
69SW2007	220644	853739	N/A	N/A	N/A	N/A	N/A	N/A
69SW2009	213383	853442	N/A	N/A	N/A	N/A	N/A	N/A
69SWCP01	227058	853600	N/A	N/A	N/A	N/A	N/A	N/A
69SWDP01	229171	851471	N/A	N/A	N/A	N/A	N/A	N/A
69SWJP01	219797	851248	N/A	N/A	N/A	N/A	N/A	N/A
69SWRP01	220472	851772	N/A	N/A	N/A	N/A	N/A	N/A

Data Source: AFCEE, February 2010, MMR-AFCEE Data Warehouse

Notes:

\* Extraction well screen length shortened between 03 and 11 June 2009 through installation of packers as a result of optimization.

N/A<sup>1</sup> - Locations represent direct push boreholes with no permanent monitoring well installation.

Key:

bgs = below ground surface

FS-28 = Fuel Spill-28

ft = feet

msl = mean sea level

N/A = information not applicable

**Table 2**  
**FS-28 Groundwater Monitoring Results**  
**FS-28 2009 Summary Letter Report**

Location	Date	Laboratory Analyses	Field Parameters					
		EDB (µg/L) MMCL <sup>1</sup> = 0.02	Temp (°C)	pH (std)	DO (mg/L)	SpC (µS/cm)	ORP (mV)	Turbidity (NTU)
69DP0148 (21.5) <sup>2</sup>	12/5/2008	ND	8.11	6.46	3.62	98	111.8	858.8
69DP0148 (16.5)	12/5/2008	ND	8.70	5.94	6.17	95	122	862.9
69DP0148 (11.5)	12/5/2008	ND	8.50	5.87	5.52	105	139.1	564
69DP0148 (6.5)	12/5/2008	ND	8.24	5.91	11.30	126	130.2	859.9
69DP0148 (1.5)	1/5/2009	ND	8.34	6.73	6.41	128	44.1	13
69DP0148 (-3.5)	1/5/2009	ND	8.80	6.16	6.81	99	92.2	424.5
69DP0148 (-8.5)	1/5/2009	ND	8.71	5.88	6.20	108	111.1	52.2
69DP0148 (-13.5)	1/5/2009	ND	8.97	5.83	4.13	108	85.5	52.2
69DP0148 (-23.5)	1/5/2009	ND	9.78	5.82	4.12	108	95.7	160.2
69DP0148 (-33.5)	1/5/2009	ND	9.58	5.84	3.85	110	73	392.8
69DP0148 (-43.5)	1/5/2009	ND	10.06	5.92	4.37	107	61	155
69DP0148 (-53.5)	1/6/2009	ND	9.28	6.86	6.04	114	70.7	115
69DP0148 (-63.5)	1/6/2009	ND	9.29	6.16	3.09	103	88	46.3
69DP0148 (-73.5)	1/6/2009	ND	9.37	6.09	5.49	119	76.4	37.9
69DP0148 (-83.5)	1/6/2009	ND	9.20	6.18	4.40	117	67	66.2
69DP0148 (-93.5)	1/6/2009	ND	9.23	6.22	6.77	70	77.9	188.8
69DP0148 (-103.5)	1/7/2009	ND	9.43	7.05	8.49	104	68.6	139.2
69DP0148 (-118.5)	1/29/2009	ND	9.98	6.94	4.83	106	98.1	276.4
69DP0148 (-128.5)	1/29/2009	ND	9.77	6.38	3.53	107	68.8	96.5
69DP0148 (-138.5)	1/29/2009	ND	9.78	6.19	5.62	105	78.2	96
69DP0148 (-148.5)	1/29/2009	BRL	10.18	6.21	4.97	113	78	113.2
69DP0148 (-158.5)	1/30/2009	0.02	9.80	6.88	5.12	124	48.2	94
69DP0148 (-168.5)	1/30/2009	BRL	10.01	6.28	6.43	280	81.6	136.2
69DP0148 (-178.5)	1/30/2009	BRL	9.79	6.36	6.30	198	47.1	889.3
69DP0149 (22.5)	1/13/2009	ND	5.47	6.54	9.35	109	-21.7	721.8
69DP0149 (12.5)	1/13/2009	ND	8.87	6.06	12.26	89	42.9	126.7
69DP0149 (2.5)	1/13/2009	ND	7.73	6.08	14.53	89	64.1	61.4
69DP0149 (-7.5)	1/13/2009	ND	10.17	6.10	10.54	79	73.7	429.4
69DP0149 (-17.5)	1/13/2009	ND	8.44	6.03	13.62	81	66.2	47.3
69DP0149 (-27.5)	1/13/2009	ND	10.24	6.05	11.74	74	99.4	338.8
69DP0149 (-37.5)	1/14/2009	ND	9.46	6.25	9.73	89	41	1819.7
69DP0149 (-47.5)	1/14/2009	ND	9.55	5.89	6.54	81	53.9	224.2
69DP0149 (-57.5)	1/14/2009	ND	9.93	5.94	10.23	80	71.2	203.3
69DP0149 (-67.5)	1/14/2009	ND	9.57	5.84	10.13	86	58	223
69DP0149 (-77.5)	1/21/2009	ND	10.12	6.14	9.12	78	113.1	92.7
69DP0149 (-87.5)	1/21/2009	BRL	9.58	6.09	10.93	78	23.8	40.1
69DP0149 (-97.5)	1/21/2009	0.02	10.30	5.93	8.65	78	1.3	78.8
69DP0149 (-107.5)	1/21/2009	<b>0.063</b>	10.21	5.94	10.33	73	60.6	66.1
69DP0149 (-117.5)	1/21/2009	<b>0.081</b>	9.98	5.97	10.68	71	53.2	45.8
69DP0149 (-127.5)	1/22/2009	0.012	10.31	6.10	10.03	74	78.5	129.2
69DP0149 (-137.5)	1/22/2009	BRL	10.20	6.15	8.72	83	69.6	156.9
69DP0149 (-147.5)	1/22/2009	BRL	10.30	6.16	8.07	92	103.2	18.9
69DP0149 (-157.5)	1/22/2009	BRL	9.81	5.89	6.84	137	137.4	25.6
69DP0149 (-167.5)	1/23/2009	BRL	10.27	6.08	7.16	220	-35.2	24.9
69DP0149 (-177.5)	1/23/2009	ND	10.28	6.02	9.58	288	67.8	53.6
69DP0149 (-187.5)	1/23/2009	BRL	10.70	6.03	9.41	352	95.6	63
69DP0149 (-197.5)	1/23/2009	BRL	10.96	6.11	6.58	408	67.4	435.2
69DP0149 (-207.5)	1/26/2009	BRL	8.68	6.48	8.92	337	21.2	897.8
69MW0032B (-56.2)	4/14/2009	ND	10.49	6.62	1.68	90	-37.4	895.1
69MW0032B (-66.2)	4/14/2009	ND	10.69	6.47	2.14	73	122.6	97

**Table 2**  
**FS-28 Groundwater Monitoring Results**  
**FS-28 2009 Summary Letter Report**

Location	Date	Laboratory Analyses	Field Parameters					
		EDB (µg/L) MMCL <sup>1</sup> = 0.02	Temp (°C)	pH (std)	DO (mg/L)	SpC (µS/cm)	ORP (mV)	Turbidity (NTU)
69MW0032B (-76.2)	4/14/2009	ND	10.73	6.38	1.66	77	94.7	54.7
69MW0032B (-86.2)	4/14/2009	0.022	10.84	6.50	3.93	72	78.4	72
69MW0032B (-96.2)	4/14/2009	0.042	11.62	6.59	4.06	73	47	245
69MW0032B (-106.2)	4/14/2009	0.097	11.07	6.66	6.13	70	131.6	88
69MW0032B (-116.2)	4/15/2009	0.104	10.61	7.13	3.83	74	33.3	182.4
69MW0032B (-126.2)	4/15/2009	0.108	10.65	6.69	4.15	73	23	364
69MW0032B (-136.2)	4/15/2009	0.128	11.39	6.74	4.03	72	49.3	91.8
69MW0032B (-146.2)	4/16/2009	0.057	10.86	6.57	2.61	94	0.4	147
69MW0032B (-156.2)	4/16/2009	0.03	11.86	6.63	3.01	78	9.2	158.5
69MW0032B (-166.2)	4/17/2009	ND	10.89	6.91	0.55	108	-31.6	251.8
69MW0032B (-176.2)	4/17/2009	BRL	11.74	7.14	0.74	113	-90.9	633.3
69MW0032B (-186.2)	4/17/2009	ND	11.53	7.18	0.92	122	-45.1	585.3
69MW0032B (-196.2)	4/20/2009	ND	11.12	7.14	1.21	120	-11.3	159.1
69MW0032B (-206.2)	4/20/2009	ND	10.79	6.74	1.06	115	-1.8	234.2
69EW0001	1/26/2009	0.157	*	*	*	*	*	*
69EW0001	2/23/2009	0.162	*	*	*	*	*	*
69EW0001	3/26/2009	0.169	*	*	*	*	*	*
69EW0001	4/24/2009	0.163	*	*	*	*	*	*
69EW0001	5/26/2009	0.171	11.49	6.49	3.57	88	139.6	0
69EW0001	6/24/2009	0.169	*	*	*	*	*	*
69EW0001	7/27/2009	0.227	*	*	*	*	*	*
69EW0001	8/28/2009	0.156	*	*	*	*	*	*
69EW0001	9/17/2009	0.171	*	*	*	*	*	*
69EW0001	9/17/2009	0.134	*	*	*	*	*	*
69EW0001	9/17/2009	0.155	*	*	*	*	*	*
69EW0001	9/24/2009	0.127	*	*	*	*	*	*
69EW0001	10/26/2009	0.117	*	*	*	*	*	*
69EW0001	11/24/2009	0.139	*	*	*	*	*	*
69EW0001	12/28/2009	0.125	11.34	5.85	2.90	93	65.6	0
69EW0002	1/26/2009	0.042	*	*	*	*	*	*
69EW0002	2/23/2009	0.043	*	*	*	*	*	*
69EW0002	3/26/2009	0.045	*	*	*	*	*	*
69EW0002	4/24/2009	0.041	*	*	*	*	*	*
69EW0002	5/26/2009	0.038	11.56	6.42	3.01	96	141.7	0
69EW0002	6/24/2009	0.043	*	*	*	*	*	*
69EW0002	7/27/2009	0.038	*	*	*	*	*	*
69EW0002	8/28/2009	0.05	*	*	*	*	*	*
69EW0002	9/17/2009	0.034	*	*	*	*	*	*
69EW0002	9/17/2009	0.041	*	*	*	*	*	*
69EW0002	9/17/2009	0.036	*	*	*	*	*	*
69EW0002	9/24/2009	0.033	*	*	*	*	*	*
69EW0002	10/26/2009	0.032	*	*	*	*	*	*
69EW0002	11/24/2009	0.022J	*	*	*	*	*	*
69EW0002	12/28/2009	0.034	11.25	6.57	1.03	92	33.4	0
69MW0028A	4/8/2009	0.025	--	--	--	--	--	--
69MW0029A	4/7/2009	0.251	--	--	--	--	--	--
69MW0029A	8/18/2009	0.317	--	--	--	--	--	--
69MW0029B	4/7/2009	0.168	--	--	--	--	--	--
69MW0029B	8/18/2009	0.17	--	--	--	--	--	--
69MW0030A	4/7/2009	ND	--	--	--	--	--	--



**Table 2**  
**FS-28 Groundwater Monitoring Results**  
**FS-28 2009 Summary Letter Report**

Location	Date	Laboratory Analyses	Field Parameters					
		EDB (µg/L) MMCL <sup>1</sup> = 0.02	Temp (°C)	pH (std)	DO (mg/L)	SpC (µS/cm)	ORP (mV)	Turbidity (NTU)
69MW0030A	8/18/2009	ND	--	--	--	--	--	--
69MW0031A	4/7/2009	ND	--	--	--	--	--	--
69MW0031A	8/18/2009	ND	--	--	--	--	--	--
69MW0032A	4/7/2009	0.118	--	--	--	--	--	--
69MW0032A	8/18/2009	0.056	--	--	--	--	--	--
69MW0032B	6/8/2009	0.085	11.24	6.39	3.83	68	164	4.4
69MW0032B	8/18/2009	0.123	--	--	--	--	--	--
69MW0033A	6/5/2009	BRL	11.91	5.88	1.28	78	191.1	32.6
69MW0034A	6/5/2009	0.056	12.38	5.91	3.57	76	121.7	26.4
69MW1272	3/24/2009	BRL	--	--	--	--	--	--
69MW1275	4/24/2009	BRL	--	--	--	--	--	--
69MW1278	4/6/2009	ND	--	--	--	--	--	--
69MW1279B	1/6/2009	ND	--	--	--	--	--	--
69MW1279B	4/3/2009	ND	--	--	--	--	--	--
69MW1279B	7/1/2009	ND	--	--	--	--	--	--
69MW1279B	10/2/2009	ND**	--	--	--	--	--	--
69MW1279C	1/6/2009	BRL	--	--	--	--	--	--
69MW1279C	4/3/2009	BRL	--	--	--	--	--	--
69MW1279C	7/1/2009	BRL	--	--	--	--	--	--
69MW1279C	10/2/2009	ND**	--	--	--	--	--	--
69MW1283A	3/24/2009	0.464	--	--	--	--	--	--
69MW1283B	3/24/2009	1.33	--	--	--	--	--	--
69MW1284A	3/24/2009	0.931	--	--	--	--	--	--
69MW1284B	3/24/2009	1.38	--	--	--	--	--	--
69MW1285A	3/24/2009	ND	--	--	--	--	--	--
69MW1285B	3/24/2009	BRL	--	--	--	--	--	--
69MW1286	3/25/2009	ND	--	--	--	--	--	--
69MW1286A	3/25/2009	BRL	--	--	--	--	--	--
69MW1290A	4/8/2009	ND	--	--	--	--	--	--
69MW1290B	4/8/2009	ND	--	--	--	--	--	--
69MW1291B	3/25/2009	ND	--	--	--	--	--	--
69MW1294	4/23/2009	ND	--	--	--	--	--	--
69MW1296A	4/8/2009	ND	--	--	--	--	--	--
69MW1297	4/23/2009	ND	--	--	--	--	--	--
69MW1300A	3/25/2009	BRL	--	--	--	--	--	--
69MW1300B	3/25/2009	ND	--	--	--	--	--	--
69MW1302	3/19/2009	ND	--	--	--	--	--	--
69MW1303A	4/23/2009	BRL	--	--	--	--	--	--
69MW1303B	4/23/2009	ND	--	--	--	--	--	--
69MW1304	4/23/2009	1.13	--	--	--	--	--	--
69MW1306A	4/7/2009	0.06	--	--	--	--	--	--
69MW1306C	4/7/2009	BRL	--	--	--	--	--	--
69MW1310	4/6/2009	0.013	--	--	--	--	--	--
69MW1311	4/8/2009	ND	--	--	--	--	--	--
69MW1312	4/8/2009	ND	--	--	--	--	--	--
69MW1313	4/23/2009	ND	--	--	--	--	--	--
69MW1314	4/6/2009	0.072	--	--	--	--	--	--
69MW1315	4/23/2009	0.148	--	--	--	--	--	--
69MW1316	4/1/2009	ND	--	--	--	--	--	--
69MW1317A	3/19/2009	ND	--	--	--	--	--	--

**Table 2**  
**FS-28 Groundwater Monitoring Results**  
**FS-28 2009 Summary Letter Report**

Location	Date	Laboratory Analyses	Field Parameters					
		EDB (µg/L) MMCL <sup>1</sup> = 0.02	Temp (°C)	pH (std)	DO (mg/L)	SpC (µS/cm)	ORP (mV)	Turbidity (NTU)
69MW1317B	3/19/2009	ND	--	--	--	--	--	--
69MW1317C	3/19/2009	ND	11.83	6.15	1.64	63	258.1	11.7
69MW1318A	4/23/2009	BRL	--	--	--	--	--	--
69MW1400A	4/6/2009	BRL	--	--	--	--	--	--
69MW1401	4/23/2009	BRL	--	--	--	--	--	--
69MW1403	3/19/2009	<b>0.063</b>	--	--	--	--	--	--
69MW1404	4/6/2009	ND	--	--	--	--	--	--
69MW1411	4/6/2009	BRL	--	--	--	--	--	--
69MW1416	4/6/2009	ND	--	--	--	--	--	--
69PZ0005B	4/7/2009	ND	--	--	--	--	--	--
69PZ0017A	4/1/2009	<b>0.032</b>	10.63	6.79	0.15	85	136	12.4
69PZ0017A	8/18/2009	<b>0.051</b>	--	--	--	--	--	--
69PZ0019B	4/7/2009	ND	--	--	--	--	--	--
69PZ0020A	4/7/2009	ND	--	--	--	--	--	--
69PZ0021A	4/7/2009	ND	--	--	--	--	--	--
69PZ0023A	4/8/2009	ND	--	--	--	--	--	--
69PZ1286B	3/25/2009	<b>0.201</b>	10.28	6.54	4.72	74	91.8	78.2
69PZ1291A	3/25/2009	BRL	9.97	5.82	0.90	87	5.4	976.9
69PZ1298A	3/25/2009	ND	10.06	5.76	7.14	74	80.3	12.3
69PZ1300A	3/25/2009	ND	10.48	5.69	0.67	76	14.1	18
69PZ1302A	3/19/2009	ND	8.58	5.63	0.32	77	196.4	89.3
69PZ1308A	4/1/2009	ND	9.72	6.19	7.57	83	187.3	333.9
69PZ1403	3/19/2009	<b>0.092</b>	10.14	5.91	4.76	86	266.6	30.2

Data Source: AFCEE, February 2010, MMR-AFCEE Data Warehouse

Notes:

1. MMCL from Massachusetts Department of Environmental Protection (MassDEP) web page, <http://www.mass.gov/dep/water/dwstand.pdf>.
2. Value in parentheses following 69DP0148, 69DP0149, and 69MW0032B location identifiers represent mid-screen elevation (feet mean sea level) of sample during vertical profiling.

**Bold** values represent EDB concentrations above the MMCL.

--: Sample collected through use of passive diffusion bag sampler; field parameter collection not performed.

\*: Water quality parameters collected semiannually from 69EW0001 and 69EW0002.

\*\*: Data reported to Reporting Limit of 0.01 µg/L.

Key:

BRL = below reporting limit

°C = degrees Celsius

DO = dissolved oxygen

EDB = ethylene dibromide

FS-28 = Fuel Spill-28

J = estimated concentration

mg/L = milligrams per liter

MMCL = Massachusetts Maximum Contaminant Level

mV = millivolts

ND = not detected

NTU = nephelometric turbidity units

ORP = oxidation-reduction potential

SpC = specific conductance

std = standard units

Temp = temperature

µg/L = micrograms per liter

µS/cm = microsiemens per centimeter

**Table 3**  
**FS-28 Surface Water Monitoring Results**  
**FS-28 2009 Summary Letter Report**

Location	Date	Laboratory Analyses	Field Parameters					
		EDB <sup>1,2</sup> (µg/L)	Temp (°C)	pH (std)	DO (mg/L)	SpC (µS/cm)	ORP (mV)	Turbidity (NTU)
69SW0006	5/19/2009	ND	16.16	6.49	9.89	84	124	0.8
69SW0006	7/6/2009	ND	19.95	6.02	7.12	87	141	1.0
69SW0006	9/4/2009	ND	18.77	6.26	6.78	88	145	0.3
69SW0010	5/19/2009	ND	16.10	6.48	10.64	84	133	2.7
69SW0010	7/6/2009	ND	19.60	6.06	8.16	88	132	1.0
69SW0010	9/4/2009	ND	18.40	6.32	8.19	88	121	3.2
69SW0010 <sup>3</sup>	9/21/2009	ND	19.15	6.50	8.52	86	118	0.0
69SW0019	5/19/2009	ND	16.31	6.37	11.57	86	111	1.2
69SW0019	7/6/2009	ND	19.46	6.05	8.46	87	109	1.3
69SW0019	9/4/2009	ND	17.90	6.11	9.04	89	137	0.3
69SW0019 <sup>3</sup>	9/21/2009	ND	17.88	6.39	9.82	88	134	9.0
69SW0046	5/19/2009	ND	16.51	6.32	12.27	84	94	2.2
69SW0046	7/6/2009	ND	18.98	5.92	8.09	88	40	1.9
69SW0046	9/4/2009	ND	17.36	6.13	8.91	88	126	0.6
69SW0046 <sup>3</sup>	9/21/2009	ND	16.83	6.45	10.13	87	117	0.3
69SW0048	5/19/2009	ND	14.45	6.53	12.73	87	119	0.9
69SW0048	7/6/2009	ND	17.36	6.09	7.88	90	116	7.5
69SW0048	9/4/2009	ND	15.05	6.13	7.29	96	156	0.6
69SW0049	5/19/2009	ND	13.23	6.77	9.97	90	107	1.5
69SW0049	7/6/2009	ND	16.56	6.55	8.46	93	103	1.3
69SW0049	9/4/2009	ND	14.36	6.18	7.80	94	154	0.5
69SW0051	9/4/2009	ND	16.84	6.35	9.31	98	148	1.0
69SW0052	9/4/2009	ND	16.68	6.56	8.97	97	138	0.5
69SW0060	5/19/2009	ND	18.27	6.10	11.32	115	129	1.3
69SW0060	7/6/2009	ND	18.42	5.90	6.56	107	112	7.2
69SW0060	9/4/2009	ND	16.53	5.83	10.64	118	169	0.8
69SW0527	5/19/2009	ND	15.81	6.79	10.98	90	97	1.8
69SW0527	7/6/2009	ND	22.58	6.96	8.86	92	64	1.2
69SW0527	9/4/2009	ND	17.58	6.48	8.18	92	136	0.6
69SW2001	5/19/2009	ND	12.69	6.08	5.87	108	42	5.2
69SW2001	7/6/2009	ND	17.25	5.98	1.10	102	-41	46.9
69SW2001	9/4/2009	ND	17.17	5.86	4.58	89	109	14.7
69SW2001	9/21/2009	ND	16.78	6.82	7.53	79	48	7.6
69SW2002	5/19/2009	ND	12.25	6.32	9.15	99	163	9.3
69SW2002	7/6/2009	ND	19.47	5.86	2.32	42	123	34.4
69SW2002	9/4/2009	ND	16.15	5.84	3.52	60	190	17.0
69SW2005	5/19/2009	ND	15.04	6.17	1.99	80	133	16.2
69SW2005	7/6/2009	ND	19.99	5.92	2.22	77	79	31.5
69SW2005	9/4/2009	ND	16.11	5.83	3.05	115	90	50.2
69SW2007	5/19/2009	ND	14.10	6.52	10.97	126	162	0.6
69SW2007	7/6/2009	ND	16.22	6.02	11.55	98	156	0.8
69SW2007	9/4/2009	ND	13.66	5.54	7.27	124	198	1.0
69SW2009	9/4/2009	ND	16.49	6.75	9.42	97	127	0.4
69SWCP01 <sup>4</sup>	5/8/2009	ND	16.29	6.71	10.35	83	230	0.3
69SWCP01 <sup>4</sup>	7/9/2009	ND	21.27	6.73	8.73	87	162	2.1

**Table 3**  
**FS-28 Surface Water Monitoring Results**  
**FS-28 2009 Summary Letter Report**

Location	Date	Laboratory Analyses	Field Parameters					
		EDB <sup>1,2</sup> (µg/L)	Temp (°C)	pH (std)	DO (mg/L)	SpC (µS/cm)	ORP (mV)	Turbidity (NTU)
69SWDP01 <sup>4</sup>	5/8/2009	ND	17.09	6.72	10.78	76	198	0.6
69SWDP01 <sup>4</sup>	7/9/2009	ND	21.80	6.86	8.87	80	176	0.6
69SWJP01	5/8/2009	ND	15.08	6.90	10.37	81	181	0.0
69SWJP01	7/9/2009	ND	23.68	6.85	9.23	85	112	2.1
69SWRP01	5/8/2009	ND	17.09	6.62	9.91	69	212	3.2
69SWRP01	7/9/2009	ND	22.85	6.46	8.53	74	147	0.8

Data Source: AFCEE, February 2010, MMR-AFCEE Data Warehouse

Notes:

1. EDB screening-level risk based concentration for imminent human health risk ( $10^{-3}$  risk) = 7.71 µg/L: Preliminary Screening-Level Human Health Risk Evaluation for Exposure to FS-28 Surface Water; Appendix D of *Final Fuel Spill-28 2002 Annual System Performance and Ecological Impact Monitoring Report*, dated March 2003.
2. EDB screening-level ecological benchmark = 31 µg/L: *Final Ethylene Dibromide Derivation of Aquatic Screening Benchmarks*, dated November 1998.
3. Resampling conducted on 21 September 2009 to confirm laboratory data quality.
4. Samples from locations 69SWCP01 and 69SWDP01 were also analyzed for volatile organic compounds (VOCs) under the recreational beach sampling program. No VOCs were detected in these samples during 2009.

Key:

°C = degrees Celsius

DO = dissolved oxygen

EDB = ethylene dibromide

FS-28 = Fuel Spill-28

mg/L = milligrams per liter

mV = millivolts

ND = not detected

NTU = nephelometric turbidity units

ORP = oxidation-reduction potential

SpC = specific conductance

std = standard units

Temp = temperature

µg/L = micrograms per liter

µS/cm = microsiemens per centimeter

**Table 4**  
**FS-28 Meeting Presentations**  
**FS-28 2009 Summary Letter Report**

**Technical Update Meetings**

28 January 2009	FS-28 Optimization Presentation Follow Up
11 February 2009	FS-28 Direct Push Results
11 March 2009	FS-28 Optimization Project Note Sign Off
10 June 2009	FS-28 Direct Push Drilling Update
16 September 2009	FS-28 Triennial Data Presentation
09 December 2009	FS-28 Triennial Data Presentation Follow Up
09 December 2009	Coonamessett Water Supply Well Sentry Well Monitoring Frequency Optimization

**MMR Cleanup Team (MMRCT) Meetings**

09 December 2009	FS-28 Update
------------------	--------------

**SMB Meetings**

No presentations

**Conferences**

No presentations

**Table 5**  
**FS-28 Treatment Plant Sampling Results**  
**FS-28 2009 Summary Letter Report**

Month of Event	Sample Date	Loc ID	Sample Location	Laboratory Analyses	Field Parameters					
				EDB (µg/L) MMCL = 0.02	Temp (°C)	SpC (µS/cm)	DO (mg/L)	pH (std)	ORP (mV)	Turbidity (NTU)
February	26-Jan-09	69EW0001	Deep Well Influent	0.157	--	--	--	--	--	--
		69EW0002	69EW0002 Influent	0.042	--	--	--	--	--	--
		69PLT01002	Intermediate (101A)	ND	--	--	--	--	--	--
		69PLT01010	Effluent	ND	--	--	--	--	--	--
March	23-Feb-09	69EW0001	Deep Well Influent	0.162	--	--	--	--	--	--
		69EW0002	69EW0002 Influent	0.043	--	--	--	--	--	--
		69PLT01002	Intermediate (101A)	0.013	--	--	--	--	--	--
		69PLT01010	Effluent	ND	--	--	--	--	--	--
Carbon was exchanged in CF101A on 17 March 2009. Following replacement, CF101B was aligned as lead vessel and CF101A as lag vessel.										
April	26-Mar-09	69EW0001	Deep Well Influent	0.169	--	--	--	--	--	--
		69EW0002	69EW0002 Influent	0.045	--	--	--	--	--	--
		69PLT01003	Intermediate (101B)	ND	--	--	--	--	--	--
		69PLT01010	Effluent	ND	--	--	--	--	--	--
May	24-Apr-09	69EW0001	Deep Well Influent	0.163	--	--	--	--	--	--
		69EW0002	69EW0002 Influent	0.041	--	--	--	--	--	--
		69PLT01003	Intermediate (101B)	0.012	--	--	--	--	--	--
		69PLT01010	Effluent	ND	--	--	--	--	--	--
Carbon was exchanged in CF101B on 07 May 2009. Following replacement, CF101A was aligned as lead vessel and CF101B as lag vessel.										
June	26-May-09	69EW0001	Deep Well Influent	0.171	11.49	88	3.57	6.49	139.6	0.0
		69EW0002	69EW0002 Influent	0.038	11.56	96	3.01	6.42	141.7	0.0
		69PLT01002	Intermediate (101A)	BRL	11.61	88	2.84	6.34	162.9	0.0
		69PLT01010	Effluent	ND	11.63	88	2.31	6.15	163.9	0.0
July	24-Jun-09	69EW0001	Deep Well Influent	0.169	--	--	--	--	--	--
		69EW0002	69EW0002 Influent	0.043	--	--	--	--	--	--
		69PLT01002	Intermediate (101A)	ND	--	--	--	--	--	--
		69PLT01010	Effluent	ND	--	--	--	--	--	--
August	27-Jul-09	69EW0001	Deep Well Influent	0.227	--	--	--	--	--	--
		69EW0002	69EW0002 Influent	0.038	--	--	--	--	--	--
		69PLT01002	Intermediate (101A)	ND	--	--	--	--	--	--
		69PLT01010	Effluent	ND	--	--	--	--	--	--



**Table 5**  
**FS-28 Treatment Plant Sampling Results**  
**FS-28 2009 Summary Letter Report**

Month of Event	Sample Date	Loc ID	Sample Location	Laboratory Analyses	Field Parameters					
				EDB (µg/L) MMCL = 0.02	Temp (°C)	SpC (µS/cm)	DO (mg/L)	pH (std)	ORP (mV)	Turbidity (NTU)
September*	28-Aug-09	69EW0001	Deep Well Influent	0.156	--	--	--	--	--	--
		69EW0002	69EW0002 Influent	0.050	--	--	--	--	--	--
		69PLT01002	Intermediate (101A)	BRL	--	--	--	--	--	--
		69PLT01010	Effluent	ND	--	--	--	--	--	--
September (Resample)*	17-Sep-09	69EW0001	69EW0001 Influent	0.171	--	--	--	--	--	--
		69EW0002	69EW0002 Influent	0.034	--	--	--	--	--	--
		69PLT01002	Intermediate (101A)	0.011	--	--	--	--	--	--
		69PLT01010	Effluent	ND	--	--	--	--	--	--
September (Split Sample 1)*	17-Sep-09	69EW0001	69EW0001 Influent	0.134	--	--	--	--	--	--
		69EW0002	69EW0002 Influent	0.041	--	--	--	--	--	--
		69PLT01002	Intermediate (101A)	0.014	--	--	--	--	--	--
		69PLT01010	Effluent	ND	--	--	--	--	--	--
September (Split Sample 2)*	17-Sep-09	69EW0001	69EW0001 Influent	0.155	--	--	--	--	--	--
		69EW0002	69EW0002 Influent	0.036	--	--	--	--	--	--
		69PLT01002	Intermediate (101A)	0.013	--	--	--	--	--	--
		69PLT01010	Effluent	ND	--	--	--	--	--	--
Carbon was exchanged in CF101A on 21 September 2009. Following replacement, CF101B was aligned as lead vessel and CF101A as lag vessel.										
October	24-Sep-09	69EW0001	69EW0001 Influent	0.127	--	--	--	--	--	--
		69EW0002	69EW0002 Influent	0.033	--	--	--	--	--	--
		69PLT01003	Intermediate (101B)	ND	--	--	--	--	--	--
		69PLT01010	Effluent	ND	--	--	--	--	--	--
November	26-Oct-09	69EW0001	69EW0001 Influent	0.117	--	--	--	--	--	--
		69EW0002	69EW0002 Influent	0.032	--	--	--	--	--	--
		69PLT01003	Intermediate (101B)	BRL	--	--	--	--	--	--
		69PLT01010	Effluent	ND	--	--	--	--	--	--
December	24-Nov-09	69EW0001	69EW0001 Influent	0.139	11.34	93	2.90	5.85	65.6	0.0
		69EW0002	69EW0002 Influent	0.022	11.25	92	1.03	6.57	33.4	0.0
		69PLT01003	Intermediate (101B)	BRL	11.32	92	2.26	5.88	56.7	0.0
		69PLT01010	Effluent	ND	11.33	92	2.84	5.88	52.1	0.0

**Table 5**  
**FS-28 Treatment Plant Sampling Results**  
**FS-28 2009 Summary Letter Report**

Month of Event	Sample Date	Loc ID	Sample Location	Laboratory Analyses	Field Parameters					
				EDB (µg/L) MMCL = 0.02	Temp (°C)	SpC (µS/cm)	DO (mg/L)	pH (std)	ORP (mV)	Turbidity (NTU)
January	28-Dec-09	69EW0001	69EW0001 Influent	0.125	--	--	--	--	--	--
		69EW0002	69EW0002 Influent	0.034	--	--	--	--	--	--
		69PLT01003	Intermediate (101B)	0.023	--	--	--	--	--	--
		69PLT01010	Effluent	ND	--	--	--	--	--	--
Carbon was exchanged in CF101B on 14 January 2010. Following replacement, CF101A was aligned as lead vessel and CF101B as lag vessel.										

Data Source: AFCEE, March 2010, MMR-AFCEE Data Warehouse

Notes:

**Bold** values represent EDB concentrations above the MMCL.

Field parameters (pH, temperature, DO, SpC, turbidity, and ORP) were measured semiannually at influent, post-GAC at each active GAC vessel, and plant effluent sampling locations. The measurements are taken using a flow-through cell and the Yellow Springs Instrument (YSI).

-- = field parameters not collected.

\* Resampling and split sampling conducted on 17 September 2009 to confirm data quality from the analytical laboratory.

\* Resample submitted to Alpha Analytical.

\* Split sample 1 submitted to Analytics Laboratory.

\* Split sample 2 submitted to Groundwater Analytical Laboratory.

Key:

BRL = below reporting limit

°C = degrees Celsius

DO = dissolved oxygen

EDB = ethylene dibromide

FS-28 = Fuel Spill-28

GAC = granular activated carbon

mg/L = milligrams per liter

MMCL = Massachusetts Maximum Contaminant Level

mV = millivolts

ND = not detected

NM = not measured

NTU = nephelometric turbidity units

ORP = oxidation-reduction potential

SpC = specific conductance

Temp = temperature

µg/L = micrograms per liter

µS/cm = microsiemens per centimeter

**Table 6**  
**FS-28 Treatment System Flow Rates**  
**FS-28 2009 Summary Letter Report**

<b>Week Ending</b>	<b>69EW0001 Flow Rate (gpm)</b>	<b>69EW0002 Flow Rate (gpm)</b>	<b>SWPs Flow Rate (gpm)</b>	<b>Treatment Plant Total Flow Rate (gpm)</b>
7-Jan-09	550	50	N/A	600
14-Jan-09	545	50	N/A	595
21-Jan-09	497	44	N/A	541
28-Jan-09	547	50	N/A	597
4-Feb-09	548	50	N/A	599
11-Feb-09	550	50	N/A	600
18-Feb-09	550	50	N/A	600
25-Feb-09	546	50	N/A	596
4-Mar-09	357	31	N/A	389
11-Mar-09	550	50	N/A	600
18-Mar-09	473	43	N/A	516
25-Mar-09	500	52	N/A	552
1-Apr-09	550	50	N/A	600
8-Apr-09	550	50	N/A	600
15-Apr-09	547	49	N/A	596
22-Apr-09	545	50	N/A	595
29-Apr-09	516	50	N/A	566
6-May-09	421	48	N/A	470
13-May-09	457	45	N/A	502
20-May-09	509	41	N/A	557
27-May-09	543	50	N/A	593
3-Jun-09	509	51	N/A	560
10-Jun-09	0	10	N/A	10
<b>Average Flow Rate (gpm)</b>	<b>494</b>	<b>46</b>	<b>N/A</b>	<b>541</b>
<b>Optimized Design Flow Rate (gpm) (2007 Scenario 01)</b>	<b>550</b>	<b>50</b>	<b>N/A</b>	<b>600</b>
<b>Percent of Optimized Design Rate</b>	<b>90</b>	<b>93</b>	<b>N/A</b>	<b>90</b>
17-Jun-09	505	44	N/A	549
24-Jun-09	543	50	N/A	594
1-Jul-09	550	50	N/A	600
8-Jul-09	550	50	N/A	600
15-Jul-09	549	50	N/A	599
22-Jul-09	478	43	N/A	521
29-Jul-09	534	48	N/A	583
5-Aug-09	547	50	N/A	597
12-Aug-09	550	30	N/A	580
19-Aug-09	550	49	N/A	599
26-Aug-09	550	50	N/A	600
2-Sep-09	550	37	N/A	587
9-Sep-09	550	50	N/A	600
16-Sep-09	550	34	N/A	584
23-Sep-09	473	43	N/A	516
30-Sep-09	550	50	N/A	600
7-Oct-09	549	50	N/A	598
14-Oct-09	548	50	N/A	598
21-Oct-09	550	50	N/A	600
28-Oct-09	550	49	N/A	599
4-Nov-09	550	50	N/A	600
11-Nov-09	491	50	N/A	541
18-Nov-09	550	48	N/A	598
25-Nov-09	550	48	N/A	598
2-Dec-09	550	50	N/A	600
9-Dec-09	550	50	N/A	600
16-Dec-09	501	50	N/A	551
23-Dec-09	550	50	N/A	600
30-Dec-09	550	50	N/A	600
<b>Average Flow Rate (gpm)</b>	<b>539</b>	<b>47</b>	<b>N/A</b>	<b>586</b>
<b>Optimized Design Flow Rate (gpm) (2009 Scenario 01)</b>	<b>550</b>	<b>50</b>	<b>N/A</b>	<b>600</b>
<b>Percent of Optimized Design Rate</b>	<b>98</b>	<b>95</b>	<b>N/A</b>	<b>98</b>

Data Source: AFCEE, February 2010, MMR-AFCEE Data Warehouse.

Notes:

- Flow rates presented are weekly averages.
- Downtimes due to routine and non-routine operations and maintenance activities were included in the calculation of the average flow rates.
- The SWPs were shutdown on an interim basis in November 2008; the SWPs were shutdown permanently on 25 February 2010.
- 2009 Scenario 01 started on 11 June 2009 with the packering of 69EW0001 with no change in design flow rate (550 gpm); operation of 69EW0002 was unchanged (50 gpm).

Key:

gpm = gallons per minute

N/A = not applicable

SWP = shallow wellpoint

**Table 7**  
**FS-28 Treatment System Downtime Summary**  
**FS-28 2009 Summary Letter Report**

Date	Hours Off-Line	Reason
1/15/2009	24.58	System off for carbon exchange.
2/27/2009	58.70	System off due to 69EW0002 VFD fault.
3/1/2009	13.77	69EW0002 off due to VFD fault.
3/17/2009	23.58	System off for carbon exchange.
3/24/2009	15.00	69EW0001 off due to power loss.
4/16/2009	16.00	Flow reduced to support bog flooding.
5/2/2009	46.50	System off due to power failure.
5/7/2009	24.33	System off for carbon exchange.
5/16/2009	33.10	69EW0002 off due to power outage.
6/3/2009	193.50	69EW0001 off for well maintenance.
6/5/2009	2.10	69EW0002 tripped off due to power failure at skid.
6/5/2009	143.00	69EW0002 off until well maintenance completed on 69EW0001.
6/16/2009	4.58	69EW0002 off due to power failure.
6/17/2009	3.00	69EW0001 off due to a power failure.
7/19/2009	22.75	69EW0002 off due to VFD fault.
7/22/2009	2.83	69EW0002 off due to power failure.
7/28/2009	5.42	Plant tripped due to a power failure at 69EW0002.
8/8/2009	68.42	69EW0002 shut down per AFCEE request.
8/13/2009	4.00	Pressure test for influent header for 69EW0002.
8/29/2009	40.03	69EW0002 off due to a power failure.
9/12/2009	54.12	69EW0002 off due to a power failure.
9/21/2009	22.92	System shut down for a carbon exchange.
10/28/2009	3.58	69EW0002 tripped off due to power failure.
11/5/2009	6.50	Flow reduced to support bog flooding.
11/9/2009	6.00	Flow reduced to support bog flooding.
11/18/2009	12.08	69EW0002 off due to a power failure.
12/15/2009	8.00	Flow reduced to support bog flooding.
12/16/2006	7.00	Flow reduced to support bog flooding.

Key:

VFD = variable frequency drive

**Table 8**  
**FS-28 Treatment System Mass Removal Summary**  
**FS-28 2009 Summary Letter Report**

Date	69EW0001 (Extraction Well Influent)		69EW0002 (Extraction Well Influent)		69PLT01023 (SWP Influent)		Total EDB Removed	
	Incremental Mass Removed (lbs)	Cumulative Mass Removed (lbs)	Incremental Mass Removed (lbs)	Cumulative Mass Removed (lbs)	Incremental Mass Removed (lbs)	Cumulative Mass Removed (lbs)	Incremental Mass Removed (lbs)	Cumulative Mass Removed (lbs)
Nov-97	0.235	0.235	--	--	--	--	0.235	0.235
Dec-97	0.229	0.465	--	--	--	--	0.229	0.465
Jan-98	0.155	0.620	--	--	--	--	0.155	0.620
Feb-98	0.199	0.819	--	--	--	--	0.199	0.819
Mar-98	0.220	1.040	--	--	--	--	0.220	1.040
Apr-98	0.148	1.188	--	--	--	--	0.148	1.188
May-98	0.125	1.312	--	--	--	--	0.125	1.312
Jun-98	0.144	1.457	--	--	--	--	0.144	1.457
Jul-98	0.134	1.591	--	--	--	--	0.134	1.591
Aug-98	0.137	1.728	--	--	--	--	0.137	1.728
Sep-98	0.167	1.895	--	--	--	--	0.167	1.895
Oct-98	0.219	2.114	--	--	--	--	0.219	2.114
Nov-98	0.378	2.492	--	--	--	--	0.378	2.492
Dec-98	0.199	2.691	--	--	--	--	0.199	2.691
Jan-99	0.180	2.871	--	--	--	--	0.180	2.871
Feb-99	0.119	2.990	--	--	--	--	0.119	2.990
Mar-99	0.141	3.131	--	--	--	--	0.141	3.131
Apr-99	0.204	3.335	--	--	0.030	0.030	0.234	3.365
May-99	0.182	3.517	--	--	0.053	0.082	0.234	3.599
Jun-99	0.171	3.688	--	--	0.056	0.139	0.228	3.827
Jul-99	0.111	3.799	--	--	0.058	0.197	0.170	3.996
Aug-99	0.125	3.924	--	--	0.055	0.252	0.179	4.176
Sep-99	0.091	4.015	--	--	0.046	0.298	0.137	4.313
Oct-99	0.076	4.090	--	--	0.050	0.348	0.125	4.438
Nov-99	0.099	4.190	--	--	0.054	0.402	0.153	4.592
Dec-99	0.101	4.291	--	--	0.042	0.444	0.144	4.735
Jan-00	0.089	4.380	--	--	0.048	0.493	0.137	4.873
Feb-00	0.076	4.456	--	--	0.040	0.533	0.116	4.989
Mar-00	0.075	4.530	--	--	0.046	0.579	0.121	5.109
Apr-00	0.082	4.612	--	--	0.059	0.638	0.141	5.250
May-00	0.081	4.694	--	--	0.066	0.705	0.148	5.399
Jun-00	0.089	4.783	--	--	0.072	0.776	0.161	5.559
Jul-00	0.089	4.872	--	--	0.061	0.838	0.150	5.710
Aug-00	0.091	4.963	--	--	0.056	0.894	0.147	5.857
Sep-00	0.088	5.051	--	--	0.057	0.951	0.145	6.002
Oct-00	0.087	5.138	--	--	0.048	0.999	0.135	6.137
Nov-00	0.090	5.228	--	--	0.041	1.039	0.131	6.267
Dec-00	0.088	5.316	--	--	0.044	1.083	0.132	6.399
Jan-01	0.081	5.397	--	--	0.027	1.110	0.108	6.507
Feb-01	0.091	5.488	--	--	0.024	1.135	0.115	6.623
Mar-01	0.083	5.571	--	--	0.029	1.163	0.112	6.734
Apr-01	0.070	5.641	--	--	0.036	1.200	0.106	6.841
May-01	0.072	5.714	--	--	0.041	1.241	0.113	6.955
Jun-01	0.081	5.795	--	--	0.045	1.285	0.126	7.080
Jul-01	0.095	5.889	--	--	0.053	1.338	0.147	7.227
Aug-01	0.086	5.976	--	--	0.047	1.385	0.133	7.361
Sep-01	0.066	6.042	--	--	0.032	1.417	0.098	7.459
Oct-01	0.082	6.124	--	--	0.037	1.454	0.120	7.578
Nov-01	0.066	6.190	--	--	0.030	1.485	0.097	7.675
Dec-01	0.080	6.270	--	--	0.027	1.512	0.107	7.782
Jan-02	0.067	6.337	--	--	0.013	1.525	0.081	7.862
Feb-02	0.068	6.405	--	--	0.010	1.535	0.078	7.940
Mar-02	0.079	6.484	--	--	0.013	1.548	0.092	8.032
Apr-02	0.075	6.559	--	--	0.017	1.565	0.093	8.124
May-02	0.083	6.643	--	--	0.023	1.588	0.106	8.231
Jun-02	0.077	6.719	--	--	0.024	1.612	0.101	8.331
Jul-02	0.090	6.810	--	--	0.023	1.635	0.113	8.445
Aug-02	0.095	6.904	--	--	0.022	1.658	0.117	8.562
Sep-02	0.089	6.993	--	--	0.020	1.677	0.108	8.670
Oct-02	0.080	7.073	--	--	0.017	1.694	0.097	8.767
Nov-02	0.080	7.153	--	--	0.017	1.711	0.097	8.864
Dec-02	0.084	7.237	--	--	0.015	1.726	0.099	8.963
Jan-03	0.079	7.316	--	--	0.010	1.736	0.089	9.052
Feb-03	0.062	7.377	--	--	0.009	1.746	0.071	9.123
Mar-03	0.059	7.436	--	--	0.014	1.760	0.073	9.196

**Table 8**  
**FS-28 Treatment System Mass Removal Summary**  
**FS-28 2009 Summary Letter Report**

Date	69EW0001 (Extraction Well Influent)		69EW0002 (Extraction Well Influent)		69PLT01023 (SWP Influent)		Total EDB Removed	
	Incremental Mass Removed (lbs)	Cumulative Mass Removed (lbs)	Incremental Mass Removed (lbs)	Cumulative Mass Removed (lbs)	Incremental Mass Removed (lbs)	Cumulative Mass Removed (lbs)	Incremental Mass Removed (lbs)	Cumulative Mass Removed (lbs)
Apr-03	0.083	7.519	--	--	0.019	1.779	0.102	9.298
May-03	0.110	7.629	--	--	0.020	1.799	0.130	9.428
Jun-03	0.104	7.733	--	--	0.017	1.816	0.121	9.549
Jul-03	0.111	7.844	--	--	0.019	1.834	0.130	9.678
Aug-03	0.091	7.935	--	--	0.015	1.849	0.106	9.784
Sep-03	0.085	8.019	--	--	0.012	1.861	0.097	9.880
Oct-03	0.072	8.091	--	--	0.010	1.872	0.082	9.963
Nov-03	0.061	8.152	--	--	0.009	1.880	0.070	10.032
Dec-03	0.063	8.215	--	--	0.010	1.890	0.073	10.105
Jan-04	0.064	8.279	--	--	0.008	1.898	0.073	10.177
Feb-04	0.071	8.351	--	--	0.006	1.904	0.077	10.255
Mar-04	0.068	8.418	--	--	0.009	1.913	0.077	10.331
Apr-04	0.074	8.492	--	--	0.011	1.924	0.085	10.416
May-04	0.078	8.570	--	--	0.013	1.937	0.090	10.507
Jun-04	0.074	8.644	--	--	0.011	1.949	0.085	10.593
Jul-04	0.081	8.725	--	--	0.010	1.959	0.092	10.684
Aug-04	0.081	8.806	--	--	0.008	1.967	0.089	10.773
Sep-04	0.078	8.884	--	--	0.007	1.974	0.085	10.858
Oct-04	0.077	8.961	--	--	0.006	1.980	0.083	10.941
Nov-04	0.073	9.034	--	--	0.005	1.986	0.078	11.020
Dec-04	0.078	9.112	--	--	0.005	1.991	0.083	11.103
Jan-05	0.068	9.180	--	--	0.003	1.993	0.071	11.173
Feb-05	0.065	9.245	--	--	0.003	1.996	0.067	11.241
Mar-05	0.078	9.323	--	--	0.005	2.001	0.083	11.324
Apr-05	0.078	9.401	--	--	0.006	2.007	0.084	11.408
May-05	0.079	9.480	--	--	0.006	2.013	0.085	11.493
Jun-05	0.072	9.552	--	--	0.006	2.019	0.078	11.571
Jul-05	0.087	9.639	--	--	0.006	2.025	0.093	11.664
Aug-05	0.077	9.716	--	--	0.005	2.029	0.081	11.745
Sep-05	0.070	9.786	--	--	0.003	2.032	0.073	11.818
Oct-05	0.071	9.857	--	--	0.003	2.036	0.074	11.893
Nov-05	0.062	9.919	--	--	0.003	2.039	0.065	11.958
Dec-05	0.070	9.988	--	--	0.003	2.042	0.073	12.030
Jan-06	0.067	10.060	--	--	0.003	2.046	0.070	12.106
Feb-06	0.056	10.110	--	--	0.002	2.048	0.059	12.158
Mar-06	0.058	10.170	--	--	0.002	2.051	0.061	12.221
Apr-06	0.059	10.230	--	--	0.002	2.053	0.061	12.283
May-06	0.062	10.290	--	--	0.002	2.055	0.064	12.345
Jun-06	0.061	10.350	--	--	0.002	2.058	0.063	12.408
Jul-06	0.063	10.420	--	--	0.002	2.060	0.065	12.480
Aug-06	0.060	10.480	--	--	0.002	2.061	0.062	12.541
Sep-06	0.060	10.540	--	--	0.001	2.062	0.061	12.602
Oct-06	0.061	10.600	--	--	0.001	2.063	0.062	12.663
Nov-06	0.058	10.650	--	--	0.001	2.064	0.059	12.714
Dec-06	0.058	10.710	--	--	0.001	2.065	0.059	12.775
Jan-07	0.055	10.770	--	--	0.000	2.065	0.056	12.835
Feb-07	0.046	10.810	--	--	0.000	2.066	0.046	12.876
Mar-07	0.045	10.860	--	--	0.000	2.066	0.046	12.926
Apr-07	0.051	10.910	--	--	0.000	2.066	0.051	12.976
May-07	0.053	10.960	--	--	0.000	2.067	0.053	13.027
Jun-07	0.051	11.010	--	--	0.000	2.067	0.052	13.077
Jul-07	0.051	11.060	--	--	0.000	2.067	0.051	13.127
Aug-07	0.047	11.110	--	--	0.000	2.067	0.047	13.177
Sep-07	0.045	11.160	--	--	0.000	2.068	0.045	13.228
Oct-07	0.044	11.200	--	--	0.000	2.068	0.044	13.268
Nov-07	0.042	11.240	--	--	0.000	2.068	0.042	13.308
Dec-07	0.044	11.290	0.002	0.002	0.000	2.068	0.046	13.360
Jan-08	0.040	11.330	0.003	0.005	0.000	2.068	0.043	13.403
Feb-08	0.034	11.360	0.002	0.007	0.000	2.068	0.036	13.435
Mar-08	0.040	11.400	0.002	0.009	0.000	2.068	0.042	13.477
Apr-08	0.039	11.440	0.002	0.010	0.000	2.068	0.040	13.518
May-08	0.039	11.480	0.001	0.012	0.000	2.068	0.041	13.560
Jun-08	0.035	11.510	0.001	0.013	0.000	2.068	0.036	13.591
Jul-08	0.031	11.550	0.001	0.014	0.000	2.068	0.032	13.632
Aug-08	0.035	11.580	0.001	0.015	0.000	2.068	0.037	13.663



**Table 8**  
**FS-28 Treatment System Mass Removal Summary**  
**FS-28 2009 Summary Letter Report**

Date	69EW0001 (Extraction Well Influent)		69EW0002 (Extraction Well Influent)		69PLT01023 (SWP Influent)		Total EDB Removed	
	Incremental Mass Removed (lbs)	Cumulative Mass Removed (lbs)	Incremental Mass Removed (lbs)	Cumulative Mass Removed (lbs)	Incremental Mass Removed (lbs)	Cumulative Mass Removed (lbs)	Incremental Mass Removed (lbs)	Cumulative Mass Removed (lbs)
Sep-08	0.032	11.610	0.001	0.016	0.000	2.068	0.033	13.694
Oct-08	0.031	11.640	0.001	0.017	0.000	2.068	0.032	13.725
Nov-08	0.033	11.680	0.001	0.018	0.000	2.068	0.034	13.766
Dec-08	0.033	11.710	0.001	0.019	0.000	2.068	0.033	13.797
Jan-09	0.033	11.740	0.001	0.019	0.000	2.068	0.033	13.827
Feb-09	0.028	11.770	0.001	0.020	0.000	2.068	0.029	13.858
Mar-09	0.031	11.800	0.001	0.021	0.000	2.068	0.032	13.889
Apr-09	0.032	11.830	0.001	0.022	0.000	2.068	0.033	13.920
May-09	0.031	11.870	0.001	0.022	0.000	2.068	0.031	13.960
Jun-09	0.025	11.890	0.001	0.023	0.000	2.068	0.025	13.981
Jul-09	0.041	11.930	0.001	0.024	0.000	2.068	0.041	14.022
Aug-09	0.037	11.970	0.001	0.024	0.000	2.068	0.038	14.062
Sep-09	0.028	12.000	0.001	0.025	0.000	2.068	0.028	14.093
Oct-09	0.025	12.020	0.001	0.025	0.000	2.068	0.025	14.113
Nov-09	0.025	12.050	0.000	0.026	0.000	2.068	0.026	14.144
Dec-09	0.026	12.070	0.001	0.026	0.000	2.068	0.027	14.164
<b>EDB removed (lbs) by SWPs during reporting period (Jan-09 - Dec-09)</b>								<b>0.000</b>
<b>EDB removed (lbs) by extraction well 69EW0001 during reporting period (Jan-09 - Dec-09)</b>								<b>0.361</b>
<b>EDB removed (lbs) by extraction well 69EW0002 during reporting period (Jan-09 - Dec-09)</b>								<b>0.008</b>
<b>Total EDB removed (lbs) during reporting period (Jan-09 - Dec-09)</b>								<b>0.369</b>
<b>Total EDB removed (lbs) since system startup (Oct-97 - Dec-09)</b>								<b>14.164</b>

Data Source: AFCEE, February 2010, MMR-AFCEE Data Warehouse

Notes:

69EW0001 started operating in October 1997.

SWPs started operating in April 1999 and were shutdown in November 2008.

69EW0002 started operating in December 2007.

Key:

-- = no data; system component not installed at this time

EDB = ethylene dibromide

FS-28 = Fuel Spill-28

lbs = pounds

SWPs = shallow wellpoints

**Table 9**  
**FS-28 Remedial Systems Electrical Consumption and Associated Air Emissions**  
**FS-28 2009 Summary Letter Report**

		1/1/2009 to 12/31/2009	System Startup (11/1997) to 12/31/2009
Volume of Groundwater Treated (million gallons)		298	4,304
Groundwater COC Mass Removal (pounds)		0.37	14.16
Electrical Usage (MWh)		402	6,408
Estimated Air Emissions <sup>1</sup> (based on electrical usage)	CO <sub>2</sub>	290	5,336
	NO <sub>x</sub>	545	8,112
	PM-10	27	284
	SO <sub>2</sub>	1,114	7,939
	VOCs	21	391
Estimated Reduction in Air Emissions due to Green Power Purchases <sup>2</sup>	CO <sub>2</sub>	145	243
	NO <sub>x</sub>	273	419
	PM-10	13	18
	SO <sub>2</sub>	557	675
	VOCs	11	17
Estimated Reduction in Air Emissions due to MMR Wind Turbine Operation <sup>3</sup>	CO <sub>2</sub>	6	6
	NO <sub>x</sub>	12	12
	PM-10	0.7	0.7
	SO <sub>2</sub>	32	32
	VOCs	0.4	0.4
Estimated Total Air Emissions with consideration of Green Power Purchases and MMR Wind Turbine Operation	CO <sub>2</sub>	140	5,088
	NO <sub>x</sub>	261	7,681
	PM-10	13	266
	SO <sub>2</sub>	525	7,231
	VOCs	10	373

Notes:

1) The estimated air emissions presented in this table are based on the assumption that until 4/30/2009, the power used to operate the MMR remedial systems was provided by the Canal Power Plant in Sandwich, MA. This power plant primarily produced electricity generated by the combustion of fuel oil and has been off-line since 5/1/2009. Starting on 5/1/2009, air emissions are based on electricity generated by the average mix of power sources in Massachusetts. Air emissions were calculated using MMR utility data from AFCEE's Metrix 4 Utility Accounting Software (<http://www.abraxasenergy.com/metrix4.php>) and emission factors obtained from the following websites:  
<http://www.csgnetwork.com/elecpowerpolcalc.html>  
<http://www.metrixcentral.com/EmissionsCalculator/Emissions%20Factors%202004.pdf>

2) Emissions offset by purchases of electricity from renewable sources beginning 7/1/2008.  
3) Emissions offset by operation of AFCEE-owned wind turbine beginning on 12/2/2009.

Key:

COC = contaminant of concern  
CO<sub>2</sub> = carbon dioxide reported in tons  
FS-28 = Fuel Spill-28  
MMR = Massachusetts Military Reservation  
MWh = megawatt hours  
NO<sub>x</sub> = nitrogen oxides reported in pounds  
PM-10 = particulate matter with a diameter of 10 micrometers or less reported in pounds  
SO<sub>2</sub> = sulfur dioxide reported in pounds  
VOCs = volatile organic compounds reported in pounds

## **ATTACHMENT A**

### **Comparison of Detected Concentrations in FS-28 Groundwater, Surface Water, and Treatment Plant Samples to Applicable Groundwater and Surface Water Standards**

**Attachment A**  
**Comparison of Detected Concentrations in FS-28 Groundwater, Surface Water, and Treatment Plant Samples**  
**to Applicable Groundwater and Surface Water Standards**  
**FS-28 2009 Summary Letter Report**

Location Identification	Sample Date	Sample Elevation (ft msl)	Matrix	Test	Analyte	Result	DL	RL	Standard	Type <sup>1</sup>	Standard Exceeded?
						All units = µg/L					
69DP0148	1/29/2009	-148.50	WA	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.002	0.01	0.02	MMCL	No
69DP0148	1/30/2009	-158.50	WA	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.02	0.002	0.01	0.02	MMCL	No
69DP0148	1/30/2009	-168.50	WA	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.002	0.01	0.02	MMCL	No
69DP0148	1/30/2009	-178.50	WA	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.002	0.01	0.02	MMCL	No
69DP0149	1/21/2009	-87.50	WA	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.002	0.01	0.02	MMCL	No
69DP0149	1/21/2009	-97.50	WA	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.02	0.002	0.01	0.02	MMCL	No
69DP0149	1/21/2009	-107.50	WA	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.063	0.002	0.01	0.02	MMCL	Yes
69DP0149	1/21/2009	-117.50	WA	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.081	0.002	0.01	0.02	MMCL	Yes
69DP0149	1/22/2009	-127.50	WA	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.012	0.002	0.01	0.02	MMCL	No
69DP0149	1/22/2009	-137.50	WA	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.002	0.01	0.02	MMCL	No
69DP0149	1/22/2009	-147.50	WA	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.002	0.01	0.02	MMCL	No
69DP0149	1/22/2009	-157.50	WA	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.002	0.01	0.02	MMCL	No
69DP0149	1/23/2009	-167.50	WA	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.002	0.01	0.02	MMCL	No
69DP0149	1/23/2009	-187.50	WA	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.002	0.01	0.02	MMCL	No
69DP0149	1/23/2009	-197.50	WA	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.002	0.01	0.02	MMCL	No
69DP0149	1/26/2009	-207.50	WA	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.002	0.01	0.02	MMCL	No
69EW0001	1/26/2009	-159.39	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.157	0.002	0.01	0.02	MMCL	Yes
69EW0001	2/23/2009	-159.39	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.162	0.002	0.01	0.02	MMCL	Yes
69EW0001	3/26/2009	-159.39	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.169	0.002	0.01	0.02	MMCL	Yes
69EW0001	4/24/2009	-159.39	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.163	0.002	0.01	0.02	MMCL	Yes
69EW0001	5/26/2009	-159.39	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.171	0.002	0.01	0.02	MMCL	Yes
69EW0001	6/24/2009	-159.39	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.169	0.003	0.01	0.02	MMCL	Yes
69EW0001	7/27/2009	-159.39	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.227	0.003	0.01	0.02	MMCL	Yes
69EW0001	8/28/2009	-159.39	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.156	0.003	0.01	0.02	MMCL	Yes
69EW0001	9/17/2009	-159.39	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.134	0.005	0.01	0.02	MMCL	Yes
69EW0001	9/17/2009	-159.39	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.155	0.001	0.01	0.02	MMCL	Yes
69EW0001	9/17/2009	-159.39	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.171	0.003	0.01	0.02	MMCL	Yes
69EW0001	9/24/2009	-159.39	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.127	0.003	0.01	0.02	MMCL	Yes
69EW0001	10/26/2009	-159.39	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.117	0.003	0.01	0.02	MMCL	Yes
69EW0001	11/24/2009	-159.39	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.139	0.003	0.01	0.02	MMCL	Yes
69EW0001	12/28/2009	-159.39	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.125	0.003	0.01	0.02	MMCL	Yes
69EW0002	1/26/2009	-140.10	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.042	0.002	0.01	0.02	MMCL	Yes
69EW0002	2/23/2009	-140.10	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.043	0.002	0.01	0.02	MMCL	Yes
69EW0002	3/26/2009	-140.10	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.045	0.002	0.01	0.02	MMCL	Yes
69EW0002	4/24/2009	-140.10	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.041	0.002	0.01	0.02	MMCL	Yes
69EW0002	5/26/2009	-140.10	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.038	0.002	0.01	0.02	MMCL	Yes
69EW0002	6/24/2009	-140.10	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.043	0.003	0.01	0.02	MMCL	Yes
69EW0002	7/27/2009	-140.10	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.038	0.003	0.01	0.02	MMCL	Yes
69EW0002	8/28/2009	-140.10	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.05	0.003	0.01	0.02	MMCL	Yes
69EW0002	9/17/2009	-140.10	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.034	0.003	0.01	0.02	MMCL	Yes
69EW0002	9/17/2009	-140.10	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.036	0.001	0.01	0.02	MMCL	Yes
69EW0002	9/17/2009	-140.10	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.041	0.005	0.01	0.02	MMCL	Yes
69EW0002	9/24/2009	-140.10	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.033	0.003	0.01	0.02	MMCL	Yes

**Attachment A**  
**Comparison of Detected Concentrations in FS-28 Groundwater, Surface Water, and Treatment Plant Samples**  
**to Applicable Groundwater and Surface Water Standards**  
**FS-28 2009 Summary Letter Report**

Location Identification	Sample Date	Sample Elevation (ft msl)	Matrix	Test	Analyte	Result	DL	RL	Standard	Type <sup>1</sup>	Standard Exceeded?
						All units = µg/L					
69EW0002	10/26/2009	-140.10	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.032	0.003	0.01	0.02	MMCL	Yes
69EW0002	11/24/2009	-140.10	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.022J	0.003	0.01	0.02	MMCL	Yes
69EW0002	12/28/2009	-140.10	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.034	0.003	0.01	0.02	MMCL	Yes
69MW0028A	4/8/2009	-69.49	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.025	0.002	0.01	0.02	MMCL	Yes
69MW0029A	4/7/2009	-129.06	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.251	0.002	0.01	0.02	MMCL	Yes
69MW0029A	8/18/2009	-129.06	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.317	0.003	0.01	0.02	MMCL	Yes
69MW0029B	4/7/2009	-92.35	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.168	0.002	0.01	0.02	MMCL	Yes
69MW0029B	8/18/2009	-92.35	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.17	0.003	0.01	0.02	MMCL	Yes
69MW0032A	4/7/2009	-128.78	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.118	0.002	0.01	0.02	MMCL	Yes
69MW0032A	8/18/2009	-128.78	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.056	0.003	0.01	0.02	MMCL	Yes
69MW0032B	6/8/2009	-96.09	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.085	0.003	0.01	0.02	MMCL	Yes
69MW0032B	8/18/2009	-96.09	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.123	0.003	0.01	0.02	MMCL	Yes
69MW0032B	4/14/2009	-86.21	WA	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.022	0.002	0.01	0.02	MMCL	Yes
69MW0032B	4/14/2009	-96.21	WA	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.042	0.002	0.01	0.02	MMCL	Yes
69MW0032B	4/14/2009	-106.21	WA	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.097	0.002	0.01	0.02	MMCL	Yes
69MW0032B	4/15/2009	-116.21	WA	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.104	0.002	0.01	0.02	MMCL	Yes
69MW0032B	4/15/2009	-126.21	WA	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.108	0.002	0.01	0.02	MMCL	Yes
69MW0032B	4/15/2009	-136.21	WA	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.128	0.002	0.01	0.02	MMCL	Yes
69MW0032B	4/16/2009	-146.21	WA	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.057	0.002	0.01	0.02	MMCL	Yes
69MW0032B	4/16/2009	-156.21	WA	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.03	0.002	0.01	0.02	MMCL	Yes
69MW0032B	4/17/2009	-176.21	WA	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.002	0.01	0.02	MMCL	No
69MW0033A	6/5/2009	5.42	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.003	0.01	0.02	MMCL	No
69MW0034A	6/5/2009	-114.40	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.056	0.003	0.01	0.02	MMCL	Yes
69MW1272	3/24/2009	-46.29	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.002	0.01	0.02	MMCL	No
69MW1275	4/24/2009	-80.74	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.002	0.01	0.02	MMCL	No
69MW1279C	1/6/2009	-105.49	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.002	0.01	0.02	MMCL	No
69MW1279C	4/3/2009	-105.49	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.002	0.01	0.02	MMCL	No
69MW1279C	7/1/2009	-105.49	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.01	0.01	0.02	MMCL	No
69MW1283A	3/24/2009	-137.00	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.464	0.004	0.02	0.02	MMCL	Yes
69MW1283B	3/24/2009	-186.10	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	1.33	0.01	0.05	0.02	MMCL	Yes
69MW1284A	3/24/2009	-180.00	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.931	0.01	0.05	0.02	MMCL	Yes
69MW1284B	3/24/2009	-215.90	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	1.38	0.01	0.05	0.02	MMCL	Yes
69MW1285B	3/24/2009	-154.30	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.002	0.01	0.02	MMCL	No
69MW1286A	3/25/2009	-102.24	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.002	0.01	0.02	MMCL	No
69MW1300A	3/25/2009	-1.30	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.002	0.01	0.02	MMCL	No
69MW1303A	4/23/2009	-174.30	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.002	0.01	0.02	MMCL	No
69MW1304	4/23/2009	-181.00	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	1.13	0.01	0.05	0.02	MMCL	Yes
69MW1306A	4/7/2009	-81.74	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.06	0.002	0.01	0.02	MMCL	Yes
69MW1306C	4/7/2009	-117.77	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.002	0.01	0.02	MMCL	No
69MW1310	4/6/2009	-202.20	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.013	0.002	0.01	0.02	MMCL	No
69MW1314	4/6/2009	-207.13	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.072	0.002	0.01	0.02	MMCL	Yes
69MW1315	4/23/2009	-176.20	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.148	0.002	0.01	0.02	MMCL	Yes
69MW1318A	4/23/2009	-129.98	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.002	0.01	0.02	MMCL	No

**Attachment A**  
**Comparison of Detected Concentrations in FS-28 Groundwater, Surface Water, and Treatment Plant Samples**  
**to Applicable Groundwater and Surface Water Standards**  
**FS-28 2009 Summary Letter Report**

Location Identification	Sample Date	Sample Elevation (ft msl)	Matrix	Test	Analyte	Result	DL	RL	Standard	Type <sup>1</sup>	Standard Exceeded?
						All units = µg/L					
69MW1400A	4/6/2009	-106.87	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.002	0.01	0.02	MMCL	No
69MW1401	4/23/2009	-109.82	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.002	0.01	0.02	MMCL	No
69MW1403	3/19/2009	-155.44	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.063	0.002	0.01	0.02	MMCL	Yes
69MW1411	4/6/2009	-133.92	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.002	0.01	0.02	MMCL	No
69PLT01002 (MID)	2/23/2009	N/A	WW	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.013	0.002	0.01	0.02	MMCL	No
69PLT01002 (MID)	5/26/2009	N/A	WW	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.002	0.01	0.02	MMCL	No
69PLT01002 (MID)	8/28/2009	N/A	WW	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.003	0.01	0.02	MMCL	No
69PLT01002 (MID)	9/17/2009	N/A	WW	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.011	0.003	0.01	0.02	MMCL	No
69PLT01002 (MID)	9/17/2009	N/A	WW	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.011	0.003	0.01	0.02	MMCL	No
69PLT01002 (MID)	9/17/2009	N/A	WW	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.013	0.001	0.01	0.02	MMCL	No
69PLT01002 (MID)	9/17/2009	N/A	WW	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.014	0.005	0.01	0.02	MMCL	No
69PLT01002 (MID)	9/17/2009	N/A	WW	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.014	0.005	0.01	0.02	MMCL	No
69PLT01003 (MID)	4/24/2009	N/A	WW	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.012	0.002	0.01	0.02	MMCL	No
69PLT01003 (MID)	10/26/2009	N/A	WW	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.003	0.01	0.02	MMCL	No
69PLT01003 (MID)	11/24/2009	N/A	WW	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.003	0.01	0.02	MMCL	No
69PLT01003 (MID)	12/28/2009	N/A	WW	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.023	0.003	0.01	0.02	MMCL	Yes
69PZ0017A	4/1/2009	-133.78	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.032	0.002	0.01	0.02	MMCL	Yes
69PZ0017A	8/18/2009	-133.78	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.051	0.003	0.01	0.02	MMCL	Yes
69PZ1286B	3/25/2009	-70.04	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.201	0.002	0.01	0.02	MMCL	Yes
69PZ1291A	3/25/2009	16.53	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.002	0.01	0.02	MMCL	No
69PZ1403	3/19/2009	-95.44	WG	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.092	0.002	0.01	0.02	MMCL	Yes

Data Source: AFCEE, February 2010, MMR-AFCEE Data Warehouse

Notes:

<sup>1</sup> MMCL from Massachusetts Department of Environmental Protection (MassDEP) web page, <http://www.mass.gov/dep/water/dwstand.pdf>.

Surface water samples were collected at FS-28 during 2009, however no analytes were detected so the data are not included in this table.

Key:

BRL = below reporting limit

DL = detection limit

EDB = ethylene dibromide

FS-28 = Fuel Spill-28

ft msl = feet mean sea level

J = estimated concentration

MID = treatment plant midpoint sample

MMCL = Massachusetts Maximum Contaminant Level

N/A = information not applicable

RL = reporting limit

WA = borehole screening sample

WG = groundwater sample

WW = plant water

µg/L = micrograms per liter

**ATTACHMENT B**  
**Well Construction Diagrams**

[69MW0032B](#)

[69MW0033A](#)

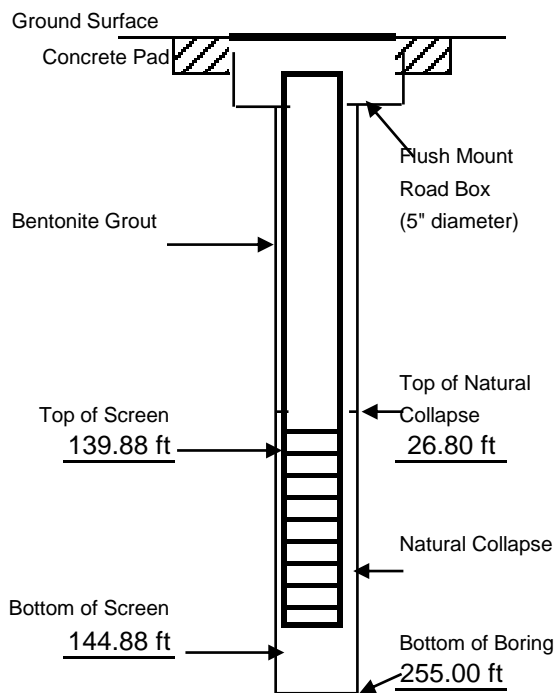
[69MW0034A](#)

**CH2MHILL**

## SMALL DIAMETER DRIVEN WELL INSTALLATION LOG PIEZOMETER/WELL INSTALLATION DIAGRAM

Project Name:	FS-28	LOC ID:	69MW0032B
Project Number:	371335-SPEIM-FS-28	Total Borehole Depth:	255 ft bgs
Date Started:	23-Apr-09	Total Well Depth:	144.88 ft bgs
Date Completed:	28-Apr-09	Construction Materials:	Schedule 40 PVC
Rig Type:	Geoprobe 6620DT	MP Elevation:	45.91 ft msl
Rig Operator:	Kurt Lyons	Surface Elevation:	46.29 ft msl
Borehole Diameter (in):	2.25	Northing:	219742.97
Well Diameter (in):	0.75	Easting:	853144.31

### GRAPHICAL REPRESENTATION



### PIEZOMETER/WELL MATERIAL DESCRIPTIONS

Well Riser: Schedule 40 PVC; flush joint threaded; 0.75 inch inner diameter; 5-foot long sections.

Well Screen: Schedule 40 PVC; flush joint threaded; 0.010-in slot size; 0.75 in diameter; 5-foot long sections; outer stainless steel wire mesh with 0.011-inch pore size; annular space filled with 20/40 quartz sand filter pack.

Bentonite Grout: Cetco Super GelX Drilling Fluid and potable water mix.

Flush Mount Box: Environmental Manufacturing, Inc.; steel construction; 5 inch diameter; 10-inch depth.

Well Cap: Geoprobe Systems, Inc.; locking well plug; 0.75-inch diameter.

### LEGEND:

LOC ID: Location Identification  
MP: Measuring Point  
in: inches  
ft: feet  
msl: mean sea level  
bgs: below ground surface

### INSTALLATION NOTES:

FIRST WATER: 31.68 ft bgs.  
REFUSAL: not encountered  
OTHER: Borehole depths are from bgs.

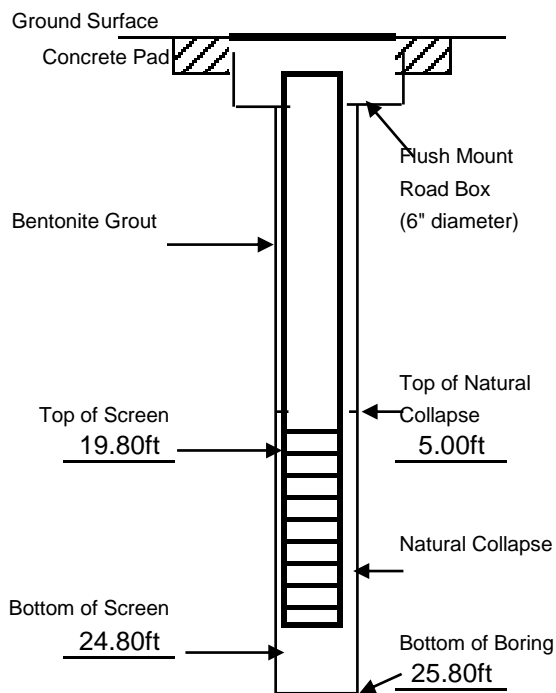


**CH2MHILL**

## SMALL DIAMETER DRIVEN WELL INSTALLATION LOG PIEZOMETER/WELL INSTALLATION DIAGRAM

Project Name:	FS-28	LOC ID:	69MW0033A
Project Number:	371335-SPEIM-FS28	Total Borehole Depth:	25.80 ft bgs
Date Started:	6-Feb-09	Total Well Depth:	24.80 ft bgs
Date Completed:	6-Feb-09	Construction Materials:	Schedule 40 PVC
Rig Type:	Geoprobe 6620DT	MP Elevation:	27.53 ft msl
Rig Operator:	Mark Gifford	Surface Elevation:	27.72 ft msl
Borehole Diameter (in):	2.25	Northing:	223500.10
Well Diameter (in):	1.0	Easting:	853475.92

### GRAPHICAL REPRESENTATION



### PIEZOMETER/WELL MATERIAL DESCRIPTIONS

Well Riser: Schedule 40 PVC; flush joint threaded; 1.0 inch inner diameter; 5-foot long sections.

Well Screen: Schedule 40 PVC; flush joint threaded; 0.010-in slot size; 1.0 in diameter; 5-foot long sections; annular space filled with natural collapse.

Flush Mount Box: Environmental Manufacturing, Inc.; steel construction; 6-inch diameter; 10-inch depth.

Well Cap: Geoprobe Systems Inc.; locking well plug; 1.0 inch diameter.

### LEGEND:

LOC ID: Location Identification  
MP: Measuring Point  
in: inches  
ft: feet  
msl: mean sea level  
bgs: below ground surface

### INSTALLATION NOTES:

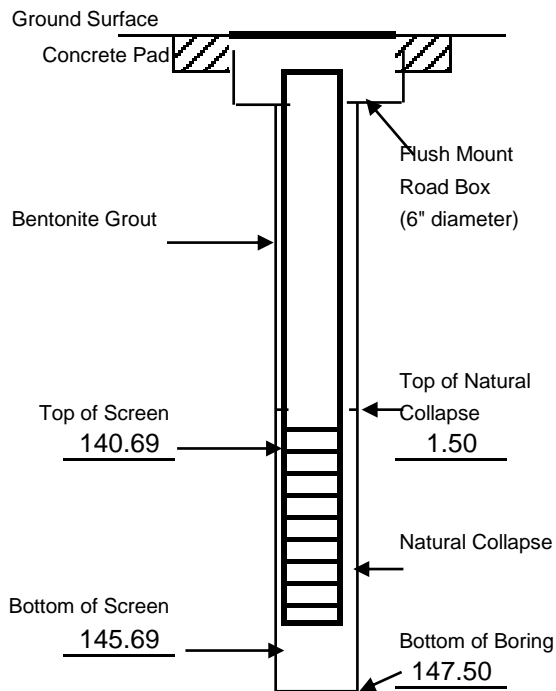
FIRST WATER: 5.00 ft bgs  
REFUSAL: not encountered  
OTHER: Borehole depths are from bgs.

## SMALL DIAMETER DRIVEN WELL INSTALLATION LOG

### PIEZOMETER/WELL INSTALLATION DIAGRAM

<b>Project Name:</b>	FS-28	<b>LOC ID:</b>	69MW0034A
<b>Project Number:</b>	371335-SPEIM-FS-28	<b>Total Borehole Depth:</b>	147.50 ft bgs
<b>Date Started:</b>	8-Apr-09	<b>Total Well Depth:</b>	145.69 ft bgs
<b>Date Completed:</b>	10-Apr-09	<b>Construction Materials:</b>	Schedule 40 PVC
<b>Rig Type:</b>	Geoprobe 6620DT	<b>MP Elevation:</b>	28.34 ft msl
<b>Rig Operator:</b>	Kurt Lyons	<b>Surface Elevation:</b>	28.79 ft msl
<b>Borehole Diameter (in):</b>	2.25	<b>Northing:</b>	223806.64
<b>Well Diameter (in):</b>	1.00	<b>Easting:</b>	853366.69

## GRAPHICAL REPRESENTATION



## PIEZOMETER/WELL MATERIAL DESCRIPTIONS

Well Riser: Schedule 40 PVC; flush joint threaded; 1.0 inch inner diameter; 5-foot long sections.

Well Screen: Schedule 40 PVC; flush joint  
threaded;0.010- inch slot size; 1.0 in diameter;  
5-foot long sections; annular space filled with  
natural collapse.

Flush Mount Box: Environmental Manufacturing, Inc.; steel construction; 6-inch diameter; 10-inch depth.

Well Cap: Geoprobe Systems Inc.;  
locking well plug; 1.0 inch diameter.

**LEGEND:**

LOC ID: Location Identification  
MP: Measuring Point  
in: inches  
ft: feet  
msl: mean sea level  
bgs: below ground surface

## INSTALLATION NOTES:

FIRST WATER:	<u>3.00 ft bgs</u>
REFUSAL:	<u>not encountered</u>
OTHER:	Borehole depths are from bgs.

**ATTACHMENT C**  
**FS-28 2009 SLR**  
**Data Summary Reports**

**ATTACHMENT C-1**

**Data Summary Report for Data Collected Under AFCEE 4P08 Task Orders  
(January 2009 through December 2009)**

**ATTACHMENT C-2**

**Data Summary Report for Data Collected Under AFCEE ECOS Task Order  
(June 2009 through December 2009)**

**ATTACHMENT C-1**  
**Data Summary Report for Data Collected Under**  
**AFCEE 4P08 Task Orders**  
**(January 2009 through December 2009)**

**Attachment C-1**  
**Data Summary Report**  
**FS-28 2009 Summary Letter Report**

## **INTRODUCTION**

The objective of this data summary report (DSR) is to assess the data quality of analytical results for samples collected for the Fuel Spill-28 System Performance and Ecological Impact Monitoring (SPEIM) Program at the Massachusetts Military Reservation (MMR) as presented in the *Fuel Spill-28 2009 Summary Letter Report*. This report is intended as a general data quality assessment designed to summarize data issues.

## **ANALYTICAL DATA**

This DSR covers 64 borewater samples with three field duplicate samples, 75 groundwater samples with two field duplicate samples, 16 surface water samples with one field duplicate sample, and 10 plant samples. Field duplicates are not required for treatment facility plant samples. These samples were reported under 37 sample delivery groups. Samples were collected between 05 December 2008 and 26 May 2009. The analyses were performed by Groundwater Analytical Laboratory (GWAM) at MMR. Samples were collected and hand-delivered to GWAM; for analysis. Samples were analyzed for one or more of the analytes/methods provided in Table C1-1.

**Table C1-1**  
**Analytical Parameter**

<b>Parameter</b>	<b>Method</b>	<b>Laboratory</b>
Ethylene Dibromide and 1,2-Dibromo-3-chloropropane	E504.1	GWAM
Volatile Organic Compounds	SW8260B	GWAM

E = Environmental Protection Agency (EPA) Method

SW = SW 846 Test Methods for Evaluating Solid Waste, 3rd Edition, Revision 4, 1996

The data were assessed using the MMR SPEIM Quality Assurance Project Plan (QAPP)<sup>1</sup>.

The assessment included a review of the following:

---

<sup>1</sup> AFCEE. 2009 (December). *Quality Assurance Project Plan for the MMR SPEIM/LTM/O&M Program*. 389849-Program-Multiple-QAPP-001. Prepared by CH2M HILL for AFCEE/MMR Installation Restoration Program, Otis Air National Guard Base, MA.

- Chain-of-Custody documentation
- Holding time compliance
- Required quality control (QC) samples at the specified frequencies
- Method blanks
- Laboratory control spiking samples
- Surrogate spike recoveries
- Internal standards
- Matrix spike/matrix spike duplicate (MS/MSD) samples on a site/location basis
- Initial and continuing calibration information and other method-specific criteria as defined by the SPEIM QAPP

Field samples were reviewed to ascertain field compliance and data quality issues. This included a review of trip blanks, equipment blanks, and field duplicates.

Definitive data generated prior to July 2004, were carried through a Tier II data validation as defined by the SPEIM QAPP. In July 2004, an automated validation approach as described in the SPEIM QAPP was implemented for samples analyzed using methods SW8260B and E504.1 received from GWAM, the onsite laboratory at MMR. When using the automated approach, the Validation Data Management System software automatically imported, validated, and created an exceedance report that was reviewed by the project chemist. The automated system reviewed all the same QC elements as the semi-automated review process with the exception of the tune criteria, internal standard recoveries and initial and continuing calibration criteria. The same flagging criteria were used for both processes.

To provide additional confidence in the automated process for these two methods, data were compared to historical results, as described in the SPEIM QAPP. They were reviewed for outlying quantitative data that might suggest a data quality issue that could affect data usability. This report was also reviewed by the project chemist. When new data appeared to be inconsistent with historical data, the automated process was superseded by manually performing a Tier II validation to resolve the identified inconsistencies. Sample locations that had insufficient historical data were validated

using the Tier II process defined in the SPEIM QAPP until sufficient data were collected to allow use of the automated system (minimum of three data points).

Data flags were assigned according to the SPEIM QAPP. These flags, and the reason for each flag, were entered into the electronic database. Multiple flags are routinely applied to specific sample method/matrix/analyte combinations, but there is only one final flag. A final flag is applied to the data, and is the most conservative of the applied validation flags. The final flag also includes matrix and blank sample impacts.

The data flags are listed in the SPEIM QAPP and are defined as follows:

- J = Analyte was present but the reported value may not be accurate or precise (estimated).
- R = Analyte result was unusable due to deficiencies in the ability to analyze the sample and meet QC criteria.
- U = Analyte was not detected at the specified detection limit.
- UJ = Analyte was not detected and the specified detection limit may not be accurate or precise (estimated).

## **FINDINGS**

The summaries of the data validation findings are contained in the following subsections.

### **Holding Times**

All holding-time criteria were met.

### **Calibration**

Initial and continuing calibrations were analyzed as required in every analytical batch and were in control for the Tier II validated data. No calibration flags were applied.

### **Method Blanks**

Method blanks were analyzed at the required frequency for each method. No method blank flags were applied.

**Field Blanks**

Trip blanks and equipment blanks were collected and analyzed at the required frequency. No field blank flags were applied.

**Field Duplicates**

Field duplicates were collected as required, and precision was acceptable. No field duplicate flags were applied.

**Matrix Spike Samples**

MS/MSDs were collected at the required frequency and provided overall acceptable accuracy and precision. No matrix flags were applied.

**Surrogates**

Surrogate recoveries met each method SPEIM QAPP criteria. No surrogate flags were applied.

**Laboratory Control Samples**

Laboratory control sample/laboratory control sample duplicates (LCS/LCSD) were analyzed as required and in control. No LCS flags were applied.

**Confirmation Results**

Confirmation samples were analyzed as required by method E504.1. No confirmation flags were applied.

**Internal Standards**

Internal standards were in control for Tier II validated data. No internal standard flags were applied.



## **Chain of Custody**

No chain of custody anomalies were noted in the review.

## **Overall Assessment**

The goal of this assessment is to demonstrate that a sufficient number of representative samples were collected and the resulting analytical data can be used to support the decision-making process. The procedures for assessing the precision, accuracy, representativeness, completeness, and comparability parameters (PARCC) are addressed in the SPEIM QAPP. The following summary highlights the PARCC findings for the above-defined events:

1. The completeness goal for valid usable data is 95 percent for aqueous samples. Completeness for aqueous samples was 100 percent and the completeness goal was met for all compounds.
2. The routinely acceptable performance of field and laboratory QC indicators (field duplicates, field blanks, laboratory blanks, MS/MSDs, surrogate spikes, LCS/LCSD, and calibrations) shows that the precision and accuracy of the data met project objectives.
3. Sample results are representative and comparable to field conditions and past historical data because the field sampling and laboratory analyses were performed using standardized and documented procedures as defined in project documents. In addition, all results were reported with industry standard units.

**Attachment C-1**  
**Analytical Laboratory Results, January - May 2009**  
**Fuel Spill-28 2009 Summary Letter Report**

Location	Sample ID	Date	Test	Type	Analyte	Matrix	Depth	Analyte Result	DL	RL	Units	Qual
69DP0148	CHPK00148AO0108	12/5/2008	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	4.5	ND	0.002	0.01	µg/L	U
69DP0148	CHPK00148BO0108	12/5/2008	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	9.5	ND	0.002	0.01	µg/L	U
69DP0148	CHPK00148CO0108	12/5/2008	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	14.5	ND	0.002	0.01	µg/L	U
69DP0148	CHPK00148DO0108	12/5/2008	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	19.5	ND	0.002	0.01	µg/L	U
69DP0148	CHPK10148EO0108	1/5/2009	E504.1	FD1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	24.5	ND	0.002	0.01	µg/L	U
69DP0148	CHPK00148EO0108	1/5/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	24.5	ND	0.002	0.01	µg/L	U
69DP0148	CHPK00148FO0108	1/5/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	29.5	ND	0.002	0.01	µg/L	U
69DP0148	CHPK00148GO0108	1/5/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	34.5	ND	0.002	0.01	µg/L	U
69DP0148	CHPK00148HO0108	1/5/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	39.5	ND	0.002	0.01	µg/L	U
69DP0148	CHPK00148IO0108	1/5/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	49.5	ND	0.002	0.01	µg/L	U
69DP0148	CHPK00148JO0108	1/5/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	59.5	ND	0.002	0.01	µg/L	U
69DP0148	CHPK00148KO0108	1/5/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	69.5	ND	0.002	0.01	µg/L	U
69DP0148	CHPK00148LO0108	1/6/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	79.5	ND	0.002	0.01	µg/L	U
69DP0148	CHPK00148MO0108	1/6/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	89.5	ND	0.002	0.01	µg/L	U
69DP0148	CHPK00148NO0108	1/6/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	99.5	ND	0.002	0.01	µg/L	U
69DP0148	CHPK00148OO0108	1/6/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	109.5	ND	0.002	0.01	µg/L	U
69DP0148	CHPK00148PO0108	1/6/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	119.5	ND	0.002	0.01	µg/L	U
69DP0148	CHPK00148QO0108	1/7/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	129.5	ND	0.002	0.01	µg/L	U
69DP0148	CHPK00148RO0108	1/29/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	144.5	ND	0.002	0.01	µg/L	U
69DP0148	CHPK00148SO0108	1/29/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	154.5	ND	0.002	0.01	µg/L	U
69DP0148	CHPK00148TO0108	1/29/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	164.5	ND	0.002	0.01	µg/L	U
69DP0148	CHPK00148UO0108	1/29/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	174.5	BRL	0.002	0.01	µg/L	J
69DP0148	CHPK00148VO0108	1/30/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	184.5	0.02	0.002	0.01	µg/L	
69DP0148	CHPK00148WO0108	1/30/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	194.5	BRL	0.002	0.01	µg/L	J
69DP0148	CHPK00148XO0108	1/30/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	204.5	BRL	0.002	0.01	µg/L	J
69DP0149	CHPK00149AO0108	1/13/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	4.5	ND	0.002	0.01	µg/L	U
69DP0149	CHPK00149BO0108	1/13/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	14.5	ND	0.002	0.01	µg/L	U
69DP0149	CHPK00149CO0108	1/13/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	24.5	ND	0.002	0.01	µg/L	U
69DP0149	CHPK00149DO0108	1/13/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	34.5	ND	0.002	0.01	µg/L	U
69DP0149	CHPK10149EO0108	1/13/2009	E504.1	FD1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	44.5	ND	0.002	0.01	µg/L	U
69DP0149	CHPK00149EO0108	1/13/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	44.5	ND	0.002	0.01	µg/L	U
69DP0149	CHPK00149FO0108	1/13/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	54.5	ND	0.002	0.01	µg/L	U
69DP0149	CHPK00149GO0108	1/14/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	64.5	ND	0.002	0.01	µg/L	U
69DP0149	CHPK00149HO0108	1/14/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	74.5	ND	0.002	0.01	µg/L	U
69DP0149	CHPK00149IO0108	1/14/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	84.5	ND	0.002	0.01	µg/L	U
69DP0149	CHPK00149JO0108	1/14/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	94.5	ND	0.002	0.01	µg/L	U
69DP0149	CHPK00149KO0108	1/21/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	104.5	ND	0.002	0.01	µg/L	U
69DP0149	CHPK00149LO0108	1/21/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	114.5	BRL	0.002	0.01	µg/L	J
69DP0149	CHPK00149MO0108	1/21/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	124.5	0.02	0.002	0.01	µg/L	
69DP0149	CHPK00149NO0108	1/21/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	134.5	0.063	0.002	0.01	µg/L	
69DP0149	CHPK00149OO0108	1/21/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	144.5	0.081	0.002	0.01	µg/L	
69DP0149	CHPK00149PO0108	1/22/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	154.5	0.012	0.002	0.01	µg/L	
69DP0149	CHPK00149QO0108	1/22/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	164.5	BRL	0.002	0.01	µg/L	J
69DP0149	CHPK00149RO0108	1/22/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	174.5	BRL	0.002	0.01	µg/L	J
69DP0149	CHPK00149SO0108	1/22/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	184.5	BRL	0.002	0.01	µg/L	J

**Attachment C-1**  
**Analytical Laboratory Results, January - May 2009**  
**Fuel Spill-28 2009 Summary Letter Report**

Location	Sample ID	Date	Test	Type	Analyte	Matrix	Depth	Analyte Result	DL	RL	Units	Qual
69DP0149	CHPK00149TO0108	1/23/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	194.5	BRL	0.002	0.01	µg/L	J
69DP0149	CHPK00149UO0108	1/23/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	204.5	ND	0.002	0.01	µg/L	U
69DP0149	CHPK00149VO0108	1/23/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	214.5	BRL	0.002	0.01	µg/L	J
69DP0149	CHPK00149WO0108	1/23/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	224.5	BRL	0.002	0.01	µg/L	J
69DP0149	CHPK00149XO0108	1/26/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	234.5	BRL	0.002	0.01	µg/L	J
69EW0001	CHTC00001-M0209	1/26/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	190.04	0.157	0.002	0.01	µg/L	
69EW0001	CHTC00001-M0309	2/23/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	190.04	0.162	0.002	0.01	µg/L	
69EW0001	CHTC00001-M0409	3/26/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	190.04	0.169	0.002	0.01	µg/L	
69EW0001	CHTC00001-M0509	4/24/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	190.04	0.163	0.002	0.01	µg/L	
69EW0001	CHTC00001-M0609	5/26/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	190.04	0.171	0.002	0.01	µg/L	
69EW0002	CHTC00002-M0209	1/26/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	192	0.042	0.002	0.01	µg/L	
69EW0002	CHTC00002-M0309	2/23/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	192	0.043	0.002	0.01	µg/L	
69EW0002	CHTC00002-M0409	3/26/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	192	0.045	0.002	0.01	µg/L	
69EW0002	CHTC00002-M0509	4/24/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	192	0.041	0.002	0.01	µg/L	
69EW0002	CHTC00002-M0609	5/26/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	192	0.038	0.002	0.01	µg/L	
69MW0028A	CHPK00104-T0108	4/8/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	97.3	0.025	0.002	0.01	µg/L	
69MW0029A	CHPK00105-T0108DIF	4/7/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	168.02	0.251	0.002	0.01	µg/L	
69MW0029B	CHPK00106-T0108DIF	4/7/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	131.8	0.168	0.002	0.01	µg/L	
69MW0030A	CHPK00107-T0108DIF	4/7/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	127.82	ND	0.002	0.01	µg/L	U
69MW0031A	CHPK00108-T0108DIF	4/7/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	157.3	ND	0.002	0.01	µg/L	U
69MW0032A	CHPK00109-T0108DIF	4/7/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	175.3	0.118	0.002	0.01	µg/L	
69MW0032B	CHPK00132AO0108	4/14/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	102.5	ND	0.002	0.01	µg/L	U
69MW0032B	CHPK00132BO0108	4/14/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	112.5	ND	0.002	0.01	µg/L	U
69MW0032B	CHPK10132CO0108	4/14/2009	E504.1	FD1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	122.5	ND	0.002	0.01	µg/L	U
69MW0032B	CHPK00132CO0108	4/14/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	122.5	ND	0.002	0.01	µg/L	U
69MW0032B	CHPK00132DO0108	4/14/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	132.5	0.022	0.002	0.01	µg/L	
69MW0032B	CHPK00132EO0108	4/14/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	142.5	0.042	0.002	0.01	µg/L	
69MW0032B	CHPK00132FO0108	4/14/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	152.5	0.097	0.002	0.01	µg/L	
69MW0032B	CHPK00132GO0108	4/15/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	162.5	0.104	0.002	0.01	µg/L	
69MW0032B	CHPK00132HO0108	4/15/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	172.5	0.108	0.002	0.01	µg/L	
69MW0032B	CHPK00132IO0108	4/15/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	182.5	0.128	0.002	0.01	µg/L	
69MW0032B	CHPK00132JO0108	4/16/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	192.5	0.057	0.002	0.01	µg/L	
69MW0032B	CHPK00132KO0108	4/16/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	202.5	0.03	0.002	0.01	µg/L	
69MW0032B	CHPK00132LO0109	4/17/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	212.5	ND	0.002	0.01	µg/L	U
69MW0032B	CHPK00132MO0109	4/17/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	222.5	BRL	0.002	0.01	µg/L	J
69MW0032B	CHPK00132NO0109	4/17/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	232.5	ND	0.002	0.01	µg/L	U
69MW0032B	CHPK00132OO0108	4/20/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	242.5	ND	0.002	0.01	µg/L	U
69MW0032B	CHPK00132PO0108	4/20/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WA	252.5	ND	0.002	0.01	µg/L	U
69MW1272	CHPK00110-T0108DIF	3/24/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	100.5	BRL	0.002	0.01	µg/L	J
69MW1275	CHPK00111-T0108DIF	4/24/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	123.5	BRL	0.002	0.01	µg/L	J
69MW1278	CHPK00112-T0108DIF	4/6/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	149.5	ND	0.002	0.01	µg/L	U
69MW1279B	CHPM0079B-Q0109DIF	1/6/2009	E504.1	N1	1,2-DIBROMO-3-CHLOROPROPANE	WG	107.7	ND	0.002	0.01	µg/L	U
69MW1279B	CHPM0079B-Q0109DIF	1/6/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	107.7	ND	0.002	0.01	µg/L	U
69MW1279B	CHPM0079B-Q0209DIF	4/3/2009	E504.1	N1	1,2-DIBROMO-3-CHLOROPROPANE	WG	107.7	ND	0.002	0.01	µg/L	U
69MW1279B	CHPM0079B-Q0209DIF	4/3/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	107.7	ND	0.002	0.01	µg/L	U

**Attachment C-1**  
**Analytical Laboratory Results, January - May 2009**  
**Fuel Spill-28 2009 Summary Letter Report**

Location	Sample ID	Date	Test	Type	Analyte	Matrix	Depth	Analyte Result	DL	RL	Units	Qual
69MW1279C	CHPM0079C-Q0109DIF	1/6/2009	E504.1	N1	1,2-DIBROMO-3-CHLOROPROPANE	WG	152.5	ND	0.002	0.01	µg/L	U
69MW1279C	CHPM0079C-Q0109DIF	1/6/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	152.5	BRL	0.002	0.01	µg/L	J
69MW1279C	CHPM0079C-Q0209DIF	4/3/2009	E504.1	N1	1,2-DIBROMO-3-CHLOROPROPANE	WG	152.5	ND	0.002	0.01	µg/L	U
69MW1279C	CHPM0079C-Q0209DIF	4/3/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	152.5	BRL	0.002	0.01	µg/L	J
69MW1283A	CHPK00113-T0108DIF	3/24/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	173.5	0.464	0.004	0.02	µg/L	
69MW1283B	CHPK00114-T0108DIF	3/24/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	222.5	1.33	0.01	0.05	µg/L	
69MW1284A	CHPK00115-T0108DIF	3/24/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	211.5	0.931	0.01	0.05	µg/L	
69MW1284B	CHPK00116-T0108DIF	3/24/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	247.5	1.38	0.01	0.05	µg/L	
69MW1285A	CHPK00117-T0108DIF	3/24/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	62.5	ND	0.002	0.01	µg/L	U
69MW1285B	CHPK00118-T0108DIF	3/24/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	182.5	BRL	0.002	0.01	µg/L	J
69MW1286	CHPK00119-T0108DIF	3/25/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	182.5	ND	0.002	0.01	µg/L	U
69MW1286A	CHPK00120-T0108DIF	3/25/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	129.77	BRL	0.002	0.01	µg/L	J
69MW1290A	CHPK10121-T0108DIF	4/8/2009	E504.1	FD1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	237.5	ND	0.002	0.01	µg/L	U
69MW1290A	CHPK00121-T0108DIF	4/8/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	237.5	ND	0.002	0.01	µg/L	U
69MW1290B	CHPK00122-T0108DIF	4/8/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	291.5	ND	0.002	0.01	µg/L	U
69MW1291B	CHPK00124-T0108DIF	3/25/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	157.5	ND	0.002	0.01	µg/L	U
69MW1294	CHPK00125-T0108DIF	4/23/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	42.5	ND	0.002	0.01	µg/L	U
69MW1296A	CHPK00126-T0108DIF	4/8/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	181.95	ND	0.002	0.01	µg/L	U
69MW1297	CHPK00127-T0108DIF	4/23/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	147.5	ND	0.002	0.01	µg/L	U
69MW1300A	CHPK00129-T0108DIF	3/25/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	27.5	BRL	0.002	0.01	µg/L	J
69MW1300B	CHPK00130-T0108DIF	3/25/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	102.5	ND	0.002	0.01	µg/L	U
69MW1302	CHPK00131-T0108DIF	3/19/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	102.5	ND	0.002	0.01	µg/L	U
69MW1303A	CHPK00132-T0108DIF	4/23/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	205.5	BRL	0.002	0.01	µg/L	J
69MW1303B	CHPK00133-T0108DIF	4/23/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	246.35	ND	0.002	0.01	µg/L	U
69MW1304	CHPK00134-T0108DIF	4/23/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	215.5	1.13	0.01	0.05	µg/L	
69MW1306A	CHPK00135-T0108DIF	4/7/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	107.5	0.06	0.002	0.01	µg/L	
69MW1306C	CHPK00136-T0108DIF	4/7/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	143.5	BRL	0.002	0.01	µg/L	J
69MW1310	CHPK00137-T0108DIF	4/6/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	235	0.013	0.002	0.01	µg/L	
69MW1311	CHPK00138-T0108DIF	4/8/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	232.5	ND	0.002	0.01	µg/L	U
69MW1312	CHPK00139-T0108DIF	4/8/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	197.5	ND	0.002	0.01	µg/L	U
69MW1313	CHPK00140-T0108DIF	4/23/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	217.5	ND	0.002	0.01	µg/L	U
69MW1314	CHPK00141-T0108DIF	4/6/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	277.5	0.072	0.002	0.01	µg/L	
69MW1315	CHPK00142-T0108DIF	4/23/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	235.5	0.148	0.002	0.01	µg/L	
69MW1316	CHPK00143-T0108DIF	4/1/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	242.5	ND	0.002	0.01	µg/L	U
69MW1317A	CHPK00144-T0108DIF	3/19/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	172.5	ND	0.002	0.01	µg/L	U
69MW1317B	CHPK00145-T0108DIF	3/19/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	141.32	ND	0.002	0.01	µg/L	U
69MW1317C	CHPK00146-T0108	3/19/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	90.25	ND	0.002	0.01	µg/L	U
69MW1318A	CHPK00168-T0108DIF	4/23/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	157.5	BRL	0.002	0.01	µg/L	J
69MW1400A	CHPK00147-T0108DIF	4/6/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	152.5	BRL	0.002	0.01	µg/L	J
69MW1401	CHPK00149-T0108DIF	4/23/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	157.5	BRL	0.002	0.01	µg/L	J
69MW1403	CHPK00150-T0108DIF	3/19/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	217.5	0.063	0.002	0.01	µg/L	
69MW1404	CHPK00151-T0108DIF	4/6/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	107.5	ND	0.002	0.01	µg/L	U
69MW1411	CHPK00169-T0108DIF	4/6/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	222.5	BRL	0.002	0.01	µg/L	J
69MW1411	CHPK10169-T0108DIF	4/6/2009	E504.1	FD1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	222.5	BRL	0.002	0.01	µg/L	J
69MW1416	CHPK00153-T0108DIF	4/6/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	122.5	ND	0.002	0.01	µg/L	U

**Attachment C-1**  
**Analytical Laboratory Results, January - May 2009**  
**Fuel Spill-28 2009 Summary Letter Report**

Location	Sample ID	Date	Test	Type	Analyte	Matrix	Depth	Analyte Result	DL	RL	Units	Qual
69PLT01002	CHTC01002-M0209	1/26/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WW		ND	0.002	0.01	µg/L	U
69PLT01002	CHTC01002-M0309	2/23/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WW		0.013	0.002	0.01	µg/L	
69PLT01002	CHTC01002-M0609	5/26/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WW		BRL	0.002	0.01	µg/L	J
69PLT01003	CHTC01003-M0409	3/26/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WW		ND	0.002	0.01	µg/L	U
69PLT01003	CHTC01003-M0509	4/24/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WW		0.012	0.002	0.01	µg/L	
69PLT01010	CHTC01010-M0209	1/26/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WW		ND	0.002	0.01	µg/L	U
69PLT01010	CHTC01010-M0309	2/23/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WW		ND	0.002	0.01	µg/L	U
69PLT01010	CHTC01010-M0409	3/26/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WW		ND	0.002	0.01	µg/L	U
69PLT01010	CHTC01010-M0509	4/24/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WW		ND	0.002	0.01	µg/L	U
69PLT01010	CHTC01010-M0609	5/26/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WW		ND	0.002	0.01	µg/L	U
69PZ0005B	CHPK00155-T0108DIF	4/7/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	42.4	ND	0.002	0.01	µg/L	U
69PZ0017A	CHPK00156-T0108	4/1/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	179.7	0.032	0.002	0.01	µg/L	
69PZ0019B	CHPK00157-T0108DIF	4/7/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	40.47	ND	0.002	0.01	µg/L	U
69PZ0020A	CHPK00158-T0108DIF	4/7/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	178.85	ND	0.002	0.01	µg/L	U
69PZ0021A	CHPK00159-T0108DIF	4/7/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	159.27	ND	0.002	0.01	µg/L	U
69PZ0023A	CHPK00160-T0108	4/8/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	172.64	ND	0.002	0.01	µg/L	U
69PZ1286B	CHPK00161-T0108	3/25/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	97.5	0.201	0.002	0.01	µg/L	
69PZ1291A	CHPK00162-T0108	3/25/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	12.5	BRL	0.002	0.01	µg/L	J
69PZ1298A	CHPK00164-T0108	3/25/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	17.5	ND	0.002	0.01	µg/L	U
69PZ1300A	CHPK00165-T0108	3/25/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	17.5	ND	0.002	0.01	µg/L	U
69PZ1302A	CHPK00166-T0108	3/19/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	17.5	ND	0.002	0.01	µg/L	U
69PZ1308A	CHPK00167-T0108	4/1/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	12.5	ND	0.002	0.01	µg/L	U
69PZ1403	CHPK00170-T0108	3/19/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	157.5	0.092	0.002	0.01	µg/L	
69SW0006	CHPL00031-M0509	5/19/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.002	0.01	µg/L	U
69SW0006	CHPL00031-M0509	5/19/2009	E504.1	FD1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.002	0.01	µg/L	U
69SW0010	CHPL00026-M0509	5/19/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.002	0.01	µg/L	U
69SW0019	CHPL00024-M0509	5/19/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.002	0.01	µg/L	U
69SW0046	CHPL00020-M0509	5/19/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.002	0.01	µg/L	U
69SW0048	CHPL00013-M0509	5/19/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.002	0.01	µg/L	U
69SW0049	CHPL00010-M0509	5/19/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.002	0.01	µg/L	U
69SW0060	CHPL00018-M0509	5/19/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.002	0.01	µg/L	U
69SW0527	CHPL00032-M0509	5/19/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.002	0.01	µg/L	U
69SW2001	CHPL00019-M0509	5/19/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.002	0.01	µg/L	U
69SW2002	CHPL00014-M0509	5/19/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.002	0.01	µg/L	U
69SW2005	CHPL00017-M0509	5/19/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.002	0.01	µg/L	U
69SW2007	CHPL00011-M0509	5/19/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.002	0.01	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.002	0.01	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	1,1,1-TRICHLOROETHANE	WS		ND	0.21	1	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	1,1,2,2-TETRACHLOROETHANE	WS		ND	0.13	1	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	1,1,2-TRICHLOROETHANE	WS		ND	0.13	1	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	1,1-DICHLOROETHANE	WS		ND	0.17	1	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	1,1-DICHLOROETHENE	WS		ND	0.19	1	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	1,2,4-TRICHLOROBENZENE	WS		ND	0.18	1	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	1,2-DIBROMO-3-CHLOROPROPANE	WS		ND	0.2	2	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.14	1	µg/L	U

**Attachment C-1**  
**Analytical Laboratory Results, January - May 2009**  
**Fuel Spill-28 2009 Summary Letter Report**

Location	Sample ID	Date	Test	Type	Analyte	Matrix	Depth	Analyte Result	DL	RL	Units	Qual
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	1,2-DICHLOROBENZENE	WS		ND	0.16	1	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	1,2-DICHLOROETHANE	WS		ND	0.13	1	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	1,2-DICHLOROPROPANE	WS		ND	0.13	1	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	1,3-DICHLOROBENZENE	WS		ND	0.13	1	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	1,4-DICHLOROBENZENE	WS		ND	0.14	1	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	BENZENE	WS		ND	0.15	1	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	BROMOCHLOROMETHANE	WS		ND	0.11	1	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	BROMODICHLOROMETHANE	WS		ND	0.14	1	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	BROMOFORM	WS		ND	0.12	1	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	BROMOMETHANE	WS		ND	0.22	2	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	CARBON TETRACHLORIDE	WS		ND	0.17	1	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	CHLOROBENZENE	WS		ND	0.16	1	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	CHLOROETHANE	WS		ND	0.23	1	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	CHLOROFORM	WS		ND	0.14	1	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	CHLOROMETHANE	WS		ND	0.23	1	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	DIBROMOCHLOROMETHANE	WS		ND	0.08	1	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	ETHYLBENZENE	WS		ND	0.13	1	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	M,P-XYLENE (SUM OF ISOMERS)	WS		ND	0.31	2	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	METHYLENE CHLORIDE	WS		ND	0.19	2	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	O-XYLENE (1,2-DIMETHYLBENZENE)	WS		ND	0.15	1	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	STYRENE	WS		ND	0.13	1	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	TETRACHLOROETHENE (PCE)	WS		ND	0.18	1	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	TOLUENE	WS		ND	0.15	1	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	TRICHLOROETHENE (TCE)	WS		ND	0.15	1	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	VINYL CHLORIDE	WS		ND	0.2	1	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	cis-1,2-DICHLOROETHENE	WS		ND	0.19	1	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	cis-1,3-DICHLOROPROPENE	WS		ND	0.13	1	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	tert-BUTYL METHYL ETHER	WS		ND	0.12	1	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	trans-1,2-DICHLOROETHENE	WS		ND	0.22	1	µg/L	U
69SWCP01	CHPV0CP01-S0109	5/8/2009	SW8260B	N1	trans-1,3-DICHLOROPROPENE	WS		ND	0.08	1	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.002	0.01	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	1,1,1-TRICHLOROETHANE	WS		ND	0.21	1	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	1,1,2,2-TETRACHLOROETHANE	WS		ND	0.13	1	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	1,1,2-TRICHLOROETHANE	WS		ND	0.13	1	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	1,1-DICHLOROETHANE	WS		ND	0.17	1	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	1,1-DICHLOROETHENE	WS		ND	0.19	1	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	1,2,4-TRICHLOROENZENE	WS		ND	0.18	1	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	1,2-DIBROMO-3-CHLOROPROPANE	WS		ND	0.2	2	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.14	1	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	1,2-DICHLOROBENZENE	WS		ND	0.16	1	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	1,2-DICHLOROETHANE	WS		ND	0.13	1	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	1,2-DICHLOROPROPANE	WS		ND	0.13	1	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	1,3-DICHLOROBENZENE	WS		ND	0.13	1	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	1,4-DICHLOROBENZENE	WS		ND	0.14	1	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	BENZENE	WS		ND	0.15	1	µg/L	U



**Attachment C-1**  
**Analytical Laboratory Results, January - May 2009**  
**Fuel Spill-28 2009 Summary Letter Report**

Location	Sample ID	Date	Test	Type	Analyte	Matrix	Depth	Analyte Result	DL	RL	Units	Qual
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	BROMOCHLOROMETHANE	WS		ND	0.11	1	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	BROMODICHLOROMETHANE	WS		ND	0.14	1	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	BROMOFORM	WS		ND	0.12	1	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	BROMOMETHANE	WS		ND	0.22	2	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	CARBON TETRACHLORIDE	WS		ND	0.17	1	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	CHLOROBENZENE	WS		ND	0.16	1	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	CHLOROETHANE	WS		ND	0.23	1	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	CHLOROFORM	WS		ND	0.14	1	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	CHLOROMETHANE	WS		ND	0.23	1	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	DIBROMOCHLOROMETHANE	WS		ND	0.08	1	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	ETHYLBENZENE	WS		ND	0.13	1	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	M,P-XYLENE (SUM OF ISOMERS)	WS		ND	0.31	2	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	METHYLENE CHLORIDE	WS		ND	0.19	2	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	O-XYLENE (1,2-DIMETHYLBENZENE)	WS		ND	0.15	1	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	STYRENE	WS		ND	0.13	1	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	TETRACHLOROETHENE (PCE)	WS		ND	0.18	1	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	TOLUENE	WS		ND	0.15	1	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	TRICHLOROETHENE (TCE)	WS		ND	0.15	1	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	VINYL CHLORIDE	WS		ND	0.2	1	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	cis-1,2-DICHLOROETHENE	WS		ND	0.19	1	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	cis-1,3-DICHLOROPROPENE	WS		ND	0.13	1	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	tert-BUTYL METHYL ETHER	WS		ND	0.12	1	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	trans-1,2-DICHLOROETHENE	WS		ND	0.22	1	µg/L	U
69SWDP01	CHPV06901-S0109	5/8/2009	SW8260B	N1	trans-1,3-DICHLOROPROPENE	WS		ND	0.08	1	µg/L	U
69SWJP01	CHPV0JP01-S0109	5/8/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.002	0.01	µg/L	U
69SWRP01	CHPV0RP01-S0109	5/8/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.002	0.01	µg/L	U

Data Source: AFCEE, January 2010, MMR-AFCEE Data Warehouse

Key:

BRL = below reporting limit

DL = detection limit

FD1 = field duplicate

J = estimated value

ND = nondetect

N1 = native sample

RL = reporting limit

U = undetected

WA = borehole water

WG = groundwater

WS = surface water

WW = wastewater

µg/L = micrograms per liter



## **ATTACHMENT C-2**

### **Data Summary Report for Data Collected Under AFCEE ECOS Task Order (June 2009 through December 2009)**

**Attachment C-2**  
**Data Summary Report**  
**Fuel Spill-28 2009 Summary Letter Report**

## INTRODUCTION

The objective of this data summary report (DSR) is to assess the quality of analytical results for samples collected from the Fuel Spill-28 (FS-28) Source Area under the System Performance and Ecological Impact Monitoring (SPEIM) Program at the Massachusetts Military Reservation (MMR), as presented in the *Fuel Spill-28 (FS-28) 2009 Summary Letter Report*. This report is intended as a general data quality assessment designed to summarize data issues.

## ANALYTICAL DATA

This DSR covers 30 groundwater samples, 35 surface water samples with three field duplicate samples, and 16 plant samples. Field duplicates are not required for plant samples from the treatment facility. These samples were reported under 17 sample delivery groups (SDGs). The samples were collected between 05 June 2009 and 28 December 2009. The analyses were performed by Alpha Analytical Laboratories (Alpha), Westborough, Massachusetts. All samples were collected and shipped same-day via Alpha courier for analysis. The samples were analyzed for one or more of the analytes/methods provided in Table C2-1.

**Table C2-1**  
**Analytical Parameter**

Parameter	Method	Laboratory
1,2-Dibromoethane (Ethylene dibromide)	E504.1	Alpha
Volatile Organic Compounds	SW8260B	Alpha

E = Environmental Protection Agency (EPA) Method  
SW = SW-846 Test Methods for Evaluating Solid Waste, 3rd Edition, Revision 4, 1996.

The data were assessed using the MMR SPEIM, Long-Term Monitoring (LTM), and Operations and Maintenance (O&M) Program, Quality Assurance Project Plan (QAPP)<sup>1</sup>

---

<sup>1</sup> AFCEE. 2009 (December). *Quality Assurance Project Plan for the MMR SPEIM/LTM/O&M Program*. 389849-Program-Multiple-QAPP-001. Prepared by CH2M HILL for AFCEE/MMR Installation Restoration Program, Otis Air National Guard Base, MA.

and QAPP Addendum<sup>2</sup>, and the U.S. Environmental Protection Agency (USEPA) Region I Data Validation Functional Guidelines (VFGs)<sup>3</sup>. The assessment included a review of the following:

- Sample delivery and condition,
- Chain-of-custody documentation,
- Holding-time compliance,
- Required quality control (QC) samples at the specified frequencies,
- Method blanks,
- Laboratory control spiking samples,
- Surrogate spike recoveries,
- Internal standards and instrument tuning,
- Matrix spike/matrix spike duplicate (MS/MSD) samples, if performed, on a site/location basis,
- Initial and continuing calibrations, and other method-specific criteria as defined by the QAPP and USEPA Region I VFGs.

Field samples were reviewed to ascertain field compliance and data quality issues. This included a review of trip blanks (TB), equipment blanks (EB), and field duplicates.

Data were carried through USEPA Region I Tier II data validation for 82 percent of the SDGs and through USEPA Region I Tier III data validation for 18 percent of the SDGs. Data flags were assigned, if necessary, according to the MMR QAPP and USEPA Region I VFGs. These flags, and the reason for each flag, were entered into the electronic database and can be found in Table C2-2 (located at the end of this report). Multiple flags are routinely applied to specific sample method/matrix/analyte combinations, but only one final flag is assigned. A final flag is applied to the data and is

---

<sup>2</sup> AFCEE. 2009 (July). *Final Quality Assurance Project Plan Addendum Long-Term Monitoring and Operations and Maintenance Programs, Massachusetts Military Reservation and Hanscom Air Force Base, Massachusetts*. Prepared by HydroGeologic, Inc. for MMR Installation Restoration Program, Department of the Air Force Otis Air National Guard Base, MA.

<sup>3</sup> USEPA. 1996 (December). *USEPA Region I New England Data Validation Functional Guidelines for Evaluating Environmental Analyses*.

the most conservative of the applied validation flags. The final flag also includes matrix and blank sample impacts.

The data flags are listed in the MMR QAPP and USEPA Region I VFGs, and are defined as follows:

- No qualifier = Analyte was detected at the reported concentration.
- J = Analyte was detected at the reported concentration; the quantitation is an estimate.
- U = Analyte was analyzed for but not detected. The associated numerical value is the reporting limit (RL). This qualifier is also applied to results considered to be artifacts based on contamination in associated blanks.
- UJ = Analyte was analyzed for but not detected. The associated numerical value is the RL, which is estimated due to deficiencies in the QC criteria. This qualifier is also applied to results considered to be artifacts based on contamination in associated blanks and have other associated QC discrepancies.
- R = Analyte was rejected due to deficiencies in the ability to analyze the sample and meet QC criteria.
- X = Excluded. The data point is associated with reanalyses or diluted analyses and is excluded because another result has been selected as the definitive result for the analyte.

## **FINDINGS**

Summaries of the data validation findings are contained in the following subsections and Table C2-2.

### **Sample Delivery and Condition**

All samples were received in acceptable condition and were properly preserved. No sample condition flags were applied.

### **Holding Times**

All holding-time criteria were met. No holding time flags were applied.

## **Calibration**

Initial, initial verification, and continuing calibrations were analyzed as required for every analytical batch and were in control. No calibration flags were applied.

## **Method Blanks**

Method blanks were analyzed at the required frequency for each method. No method blank flags were applied.

## **Field Blanks**

TBs and EBs were collected and analyzed at the required frequency. No field blank flags were applied.

## **Field Duplicates**

Field duplicates were collected as required, and precision was acceptable overall. No field duplicate flags were applied.

## **Confirmation Column Precision**

The primary and confirmation column precision for the Method E504.1 analyses were acceptable overall, with one exception. Analyte 1,2-dibromoethane was above the Method E504.1 relative percent difference (RPD) criteria for one sample. The 1,2-dibromoethane result was a detection above the RL and was flagged J.

## **Matrix Spike Samples**

MS/MSDs analyses were not requested or performed on any sample associated with the SDGs in this report.

## **Surrogates**

Surrogate recoveries for each method were within the MMR QAPP and USEPA Region I VFG acceptance limits, with the following exception. Surrogate 1,1,1,2-tetrachloroethane was recovered below the Method E504.1 lower control limit for one sample; the 1,2-dibromoethane result was a non-detection and was qualified UJ.

## **Laboratory Control Samples**

Laboratory control samples (LCS) and LCS duplicates (LCSD) were analyzed as required and in control. No LCS/LCSD flags were applied.

## **Internal Standards and Instrument Tuning**

All internal standards met the peak area and retention time criteria. All sample analytical sequences were performed within 12 hours of an acceptable instrument tune. No internal standard or instrument tuning flags were applied.

## **Chain of Custody**

No chain-of-custody anomalies were noted in the review. No flags were applied.

## **Excluded Samples**

Several samples were flagged with an X appended to the laboratory-applied qualifier to denote that the results were removed due to required dilutions or reanalyses. Each removed data point was replaced with a result that was selected by the validator as the definitive result for the analyte. X-qualified data are not presented in Table C2-2, as the flag is not an indication of data quality, but a notation that the result was not used.

## **Overall Assessment**

The goal of this assessment is to demonstrate that a sufficient number of representative samples were collected and that the resulting analytical data can be used to support the decision-making process. The procedures for assessing the precision, accuracy,

representativeness, completeness, and comparability parameters (PARCC) are addressed in the MMR QAPP and USEPA Region I VFGs. The following summary highlights the PARCC findings for the above-defined events:

1. The completeness goal for valid usable data is 95 percent for aqueous samples. Completeness for the FS-28 samples was 100 percent, and the completeness goal was met for all compounds.
2. The routinely acceptable performance of field and laboratory QC indicators (field duplicates, field blanks, laboratory blanks, MS/MSDs, surrogate spikes, LCS, and calibrations) generally shows that the precision and accuracy of the data meet project objectives. Accuracy and precision exceedances in the surrogate and confirmation column analyses are believed to be caused by sample heterogeneity or matrix interference in the analytical process.
3. Sample results are representative and comparable to field conditions and past historical data because the field sampling and laboratory analyses were performed using standardized and documented procedures as defined in project documents. In addition, all results were reported with industry standard units.



**Table C2-2  
Validation Flags<sup>a</sup>**

Field ID	Method	Analyte	Final Result	Units	Final Flag	Reason
69EW0002-WG-112409	E504.1	1,2-Dibromoethane	0.022	µg/L	J	CF
69SW2002-SW-090409	E504.1	1,2-Dibromoethane	0.010	µg/L	UJ	SSL

<sup>a</sup> Only field samples and field duplicates, if applicable, are reported in this table.

Table sorted by Reason, Analyte and Field ID.

Notes:

CF = Confirmation column and primary column precision exceeded.

SSL = Surrogate recovery less than lower control limit.

µg/L = micrograms per liter

**Attachment C-2**  
**Analytical Laboratory Results, June - December 2009**  
**FS-28 2009 Summary Letter Report**

Location	Sample ID	Date	Test	Type	Analyte	Matrix	Depth	Analyte Result	DL	RL	Units	Qual
69EW0001	69EW0001-WW-062409	6/24/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	190.04	0.169	0.003	0.01	µg/L	
69EW0001	69EW0001-WW-072709	7/27/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	190.04	0.227	0.003	0.01	µg/L	
69EW0001	69EW0001-WW-082809	8/28/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	190.04	0.156	0.003	0.01	µg/L	
69EW0001	69EW0001-WG-091709	9/17/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	190.04	0.171	0.003	0.01	µg/L	
69EW0001	69EW0001-WG-091709-ANAP	9/17/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	190.04	0.134	0.005	0.01	µg/L	
69EW0001	69EW0001-WG-091709-GWAB	9/17/2009	E504.1	N2	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	190.04	0.155	0.001	0.01	µg/L	
69EW0001	69EW0001-WG-092409	9/24/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	190.04	0.127	0.003	0.01	µg/L	
69EW0001	69EW0001-WG-102609	10/26/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	190.04	0.117	0.003	0.01	µg/L	
69EW0001	69EW0001-WG-112409	11/24/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	190.04	0.139	0.003	0.01	µg/L	
69EW0001	69EW0001-WG-122809	12/28/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	190.04	0.125	0.003	0.01	µg/L	
69EW0002	69EW0002-WW-062409	6/24/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	192	0.043	0.003	0.01	µg/L	
69EW0002	69EW0002-GW-072709	7/27/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	192	0.038	0.003	0.01	µg/L	
69EW0002	69EW0002-GW-082809	8/28/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	192	0.05	0.003	0.01	µg/L	
69EW0002	69EW0002-WG-091709	9/17/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	192	0.034	0.003	0.01	µg/L	
69EW0002	69EW0002-WG-091709-ANAP	9/17/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	192	0.041	0.005	0.01	µg/L	
69EW0002	69EW0002-WG-091709-GWAB	9/17/2009	E504.1	N2	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	192	0.036	0.001	0.01	µg/L	
69EW0002	69EW0002-WG-092409	9/24/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	192	0.033	0.003	0.01	µg/L	
69EW0002	69EW0002-WG-102609	10/26/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	192	0.032	0.003	0.01	µg/L	
69EW0002	69EW0002-WG-112409	11/24/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	192	0.022	0.003	0.01	µg/L	J
69EW0002	69EW0002-WG-122809	12/28/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	192	0.034	0.003	0.01	µg/L	
69MW0029A	69MW0029A-GW-081809 DIF	8/18/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	168.02	0.317	0.003	0.01	µg/L	
69MW0029B	69MW0029B-GW-081809 DIF	8/18/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	131.8	0.17	0.003	0.01	µg/L	
69MW0030A	69MW0030A-GW-081809 DIF	8/18/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	127.82	ND	0.003	0.01	µg/L	U
69MW0031A	69MW0031A-GW-081809 DIF	8/18/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	157.3	ND	0.003	0.01	µg/L	U
69MW0032A	69MW0032A-GW-081809 DIF	8/18/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	175.3	0.056	0.003	0.01	µg/L	
69MW0032B	69MW0032B-GW-060809	6/8/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	142.38	0.085	0.003	0.01	µg/L	
69MW0032B	69MW0032B-GW-081809 DIF	8/18/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	142.38	0.123	0.003	0.01	µg/L	
69MW0033A	69MW0033A-GW-060509	6/5/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	22.3	BRL	0.003	0.01	µg/L	J
69MW0034A	69MW0034A-GW-060509	6/5/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	143.19	0.056	0.003	0.01	µg/L	
69MW1279B	69MW1279B-GW-070109	7/1/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	107.7	ND	0.009	0.01	µg/L	U
69MW1279B	69MW1279B-WG-100209-DIF	10/2/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	107.7	ND	0.003	0.01	µg/L	U
69MW1279C	69MW1279C-GW-070109	7/1/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	152.5	BRL	0.01	0.01	µg/L	J
69MW1279C	69MW1279C-WG-100209-DIF	10/2/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	152.5	ND	0.003	0.01	µg/L	U
69PLT01002	69PLT01002-WW-062409	6/24/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WW		ND	0.003	0.01	µg/L	U
69PLT01002	69PLT01002-WW-072709	7/27/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WW		ND	0.003	0.01	µg/L	U
69PLT01002	69PLT01002-WW-082809	8/28/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WW		BRL	0.003	0.01	µg/L	J
69PLT01002	69PLT01002-WW-091709	9/17/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WW		0.011	0.003	0.01	µg/L	
69PLT01002	69PLT01002-WW-091709	9/17/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WW		0.014	0.005	0.01	µg/L	

**Attachment C-2**  
**Analytical Laboratory Results, June - December 2009**  
**FS-28 2009 Summary Letter Report**

Location	Sample ID	Date	Test	Type	Analyte	Matrix	Depth	Analyte Result	DL	RL	Units	Qual
69PLT01002	69PLT01002-WW-091709-ANAP	9/17/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WW		0.011	0.003	0.01	µg/L	
69PLT01002	69PLT01002-WW-091709-ANAP	9/17/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WW		0.014	0.005	0.01	µg/L	
69PLT01002	69PLT01002-WW-091709-GWAB	9/17/2009	E504.1	N2	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WW		0.013	0.001	0.01	µg/L	
69PLT01003	69PLT01003-WW-092409	9/24/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WW		ND	0.003	0.01	µg/L	U
69PLT01003	69PLT01003-WW-102609	10/26/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WW		BRL	0.003	0.01	µg/L	J
69PLT01003	69PLT01003-WW-112409	11/24/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WW		BRL	0.003	0.01	µg/L	J
69PLT01003	69PLT01003-WW-122809	12/28/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WW		0.023	0.003	0.01	µg/L	
69PLT01010	69PLT01010-WW-062409	6/24/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WW		ND	0.003	0.01	µg/L	U
69PLT01010	69PLT01010-WW-072709	7/27/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WW		ND	0.003	0.01	µg/L	U
69PLT01010	69PLT01010-WW-082809	8/28/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WW		ND	0.003	0.01	µg/L	U
69PLT01010	69PLT01010-WW-091709	9/17/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WW		ND	0.003	0.01	µg/L	U
69PLT01010	69PLT01010-WW-091709	9/17/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WW		ND	0.005	0.01	µg/L	U
69PLT01010	69PLT01010-WW-091709-ANAP	9/17/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WW		ND	0.003	0.01	µg/L	U
69PLT01010	69PLT01010-WW-091709-ANAP	9/17/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WW		ND	0.005	0.01	µg/L	U
69PLT01010	69PLT01010-WW-091709-GWAB	9/17/2009	E504.1	N2	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WW		ND	0.001	0.01	µg/L	U
69PLT01010	69PLT01010-WW-092409	9/24/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WW		ND	0.003	0.01	µg/L	U
69PLT01010	69PLT01010-WW-102609	10/26/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WW		ND	0.003	0.01	µg/L	U
69PLT01010	69PLT01010-WW-112409	11/24/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WW		ND	0.003	0.01	µg/L	U
69PLT01010	69PLT01010-WW-122809	12/28/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WW		ND	0.003	0.01	µg/L	U
69PZ0017A	69PZ0017A-GW-081809 DIF	8/18/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WG	179.7	0.051	0.003	0.01	µg/L	
69SW0006	69SW0006-SW-070609	7/6/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SW0006	69SW0006-SW-090409	9/4/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SW0010	69SW0010-SW-070609	7/6/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SW0010	69SW0010-SW-090409	9/4/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SW0010	69SW0010-SW-092109-AA	9/21/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SW0019	69SW0019-SW-070609	7/6/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SW0019	69SW0019-SW-090409	9/4/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SW0019	69SWFD-SW-090409	9/4/2009	E504.1	FD1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SW0019	69SW0019-SW-092109-AA	9/21/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SW0046	69SW0046-SW-070609	7/6/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SW0046	69SW0046-SW-090409	9/4/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SW0046	69SW0046-SW-092109-AA	9/21/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SW0048	69SW0048-SW-070609	7/6/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SW0048	69SW0048-SW-070609FD	7/6/2009	E504.1	FD1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SW0048	69SW0048-SW-090409	9/4/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SW0049	69SW0049-SW-070609	7/6/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SW0049	69SW0049-SW-090409	9/4/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SW0051	69SW0051-SW-090409	9/4/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U

**Attachment C-2**  
**Analytical Laboratory Results, June - December 2009**  
**FS-28 2009 Summary Letter Report**

Location	Sample ID	Date	Test	Type	Analyte	Matrix	Depth	Analyte Result	DL	RL	Units	Qual
69SW0052	69SW0052-SW-090409	9/4/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SW0060	69SW0060-SW-070609	7/6/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SW0060	69SW0060-SW-090409	9/4/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SW0527	69SW0527-SW-070609	7/6/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SW0527	69SW0527-SW-090409	9/4/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SW2001	69SW2001-SW-070609	7/6/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SW2001	69SW2001-SW-090409	9/4/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SW2001	69SW2001-SW-092109-AA	9/21/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SW2001	69SWFD-SW-092109-AA	9/21/2009	E504.1	FD1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SW2002	69SW2002-SW-070609	7/6/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SW2002	69SW2002-SW-090409	9/4/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	UJ
69SW2005	69SW2005-SW-070609	7/6/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SW2005	69SW2005-SW-090409	9/4/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SW2007	69SW2007-SW-070609	7/6/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SW2007	69SW2007-SW-090409	9/4/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SW2009	69SW2009-SW-090409	9/4/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	1,1,1-TRICHLOROETHANE	WS		ND	0.16	1	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	1,1,2,2-TETRACHLOROETHANE	WS		ND	0.14	1	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	1,1,2-TRICHLOROETHANE	WS		ND	0.2	1	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	1,1-DICHLOROETHANE	WS		ND	0.15	1	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	1,1-DICHLOROETHENE	WS		ND	0.17	1	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	1,2,4-TRICHLOROBENZENE	WS		ND	0.44	2	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	1,2-DIBROMO-3-CHLOROPROPANE	WS		ND	0.53	2	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.2	1	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	1,2-DICHLOROBENZENE	WS		ND	0.18	1	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	1,2-DICHLOROETHANE	WS		ND	0.15	1	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	1,2-DICHLOROPROPANE	WS		ND	0.13	1	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	1,3-DICHLOROBENZENE	WS		ND	0.2	1	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	1,4-DICHLOROBENZENE	WS		ND	0.21	1	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	BENZENE	WS		ND	0.16	1	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	BROMOCHLOROMETHANE	WS		ND	0.18	1	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	BROMODICHLOROMETHANE	WS		ND	0.16	1	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	BROMOFORM	WS		ND	0.22	1	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	BROMOMETHANE	WS		ND	0.29	2	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	CARBON TETRACHLORIDE	WS		ND	0.14	1	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	CHLOROBENZENE	WS		ND	0.18	1	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	CHLOROETHANE	WS		ND	0.22	1	µg/L	U

**Attachment C-2**  
**Analytical Laboratory Results, June - December 2009**  
**FS-28 2009 Summary Letter Report**

Location	Sample ID	Date	Test	Type	Analyte	Matrix	Depth	Analyte Result	DL	RL	Units	Qual
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	CHLOROFORM	WS		ND	0.15	1	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	CHLOROMETHANE	WS		ND	0.37	1	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	cis-1,2-DICHLOROETHENE	WS		ND	0.19	1	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	cis-1,3-DICHLOROPROPENE	WS		ND	0.14	1	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	DIBROMOCHLOROMETHANE	WS		ND	0.16	1	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	ETHYLBENZENE	WS		ND	0.17	1	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	M,P-XYLENE (SUM OF ISOMERS)	WS		ND	0.33	2	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	METHYLENE CHLORIDE	WS		ND	0.57	2	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	O-XYLENE (1,2-DIMETHYLBENZENE)	WS		ND	0.33	1	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	STYRENE	WS		ND	0.36	1	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	tert-BUTYL METHYL ETHER	WS		ND	0.16	1	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	TETRACHLOROETHENE (PCE)	WS		ND	0.18	1	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	TOLUENE	WS		ND	0.16	1	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	trans-1,2-DICHLOROETHENE	WS		ND	0.16	1	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	trans-1,3-DICHLOROPROPENE	WS		ND	0.17	1	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	TRICHLOROETHENE (TCE)	WS		ND	0.18	1	µg/L	U
69SWCP01	69SWCP01-SW-070909	7/9/2009	SW8260B	N1	VINYL CHLORIDE	WS		ND	0.38	1	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	1,1,1-TRICHLOROETHANE	WS		ND	0.16	1	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	1,1,2,2-TETRACHLOROETHANE	WS		ND	0.14	1	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	1,1,2-TRICHLOROETHANE	WS		ND	0.2	1	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	1,1-DICHLOROETHANE	WS		ND	0.15	1	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	1,1-DICHLOROETHENE	WS		ND	0.17	1	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	1,2,4-TRICHLOROETHANE	WS		ND	0.44	2	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	1,2-DIBROMO-3-CHLOROPROPANE	WS		ND	0.53	2	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.2	1	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	1,2-DICHLOROBENZENE	WS		ND	0.18	1	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	1,2-DICHLOROETHANE	WS		ND	0.15	1	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	1,2-DICHLOROPROPANE	WS		ND	0.13	1	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	1,3-DICHLOROBENZENE	WS		ND	0.2	1	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	1,4-DICHLOROBENZENE	WS		ND	0.21	1	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	BENZENE	WS		ND	0.16	1	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	BROMOCHLOROMETHANE	WS		ND	0.18	1	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	BROMODICHLOROMETHANE	WS		ND	0.16	1	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	BROMOFORM	WS		ND	0.22	1	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	BROMOMETHANE	WS		ND	0.29	2	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	CARBON TETRACHLORIDE	WS		ND	0.14	1	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	CHLOROBENZENE	WS		ND	0.18	1	µg/L	U

**Attachment C-2**  
**Analytical Laboratory Results, June - December 2009**  
**FS-28 2009 Summary Letter Report**

Location	Sample ID	Date	Test	Type	Analyte	Matrix	Depth	Analyte Result	DL	RL	Units	Qual
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	CHLOROETHANE	WS		ND	0.22	1	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	CHLOROFORM	WS		ND	0.15	1	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	CHLOROMETHANE	WS		ND	0.37	1	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	cis-1,2-DICHLOROETHENE	WS		ND	0.19	1	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	cis-1,3-DICHLOROPROPENE	WS		ND	0.14	1	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	DIBROMOCHLOROMETHANE	WS		ND	0.16	1	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	ETHYLBENZENE	WS		ND	0.17	1	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	M,P-XYLENE (SUM OF ISOMERS)	WS		ND	0.33	2	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	METHYLENE CHLORIDE	WS		ND	0.57	2	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	O-XYLENE (1,2-DIMETHYLBENZENE)	WS		ND	0.33	1	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	STYRENE	WS		ND	0.36	1	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	tert-BUTYL METHYL ETHER	WS		ND	0.16	1	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	TETRACHLOROETHENE (PCE)	WS		ND	0.18	1	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	TOLUENE	WS		ND	0.16	1	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	trans-1,2-DICHLOROETHENE	WS		ND	0.16	1	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	trans-1,3-DICHLOROPROPENE	WS		ND	0.17	1	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	TRICHLOROETHENE (TCE)	WS		ND	0.18	1	µg/L	U
69SWDP01	69SWDP01-SW-070909	7/9/2009	SW8260B	N1	VINYL CHLORIDE	WS		ND	0.38	1	µg/L	U
69SWJP01	69SWJP01-SW-070909	7/9/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U
69SWRP01	69SWRP01-SW-070909	7/9/2009	E504.1	N1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	WS		ND	0.003	0.01	µg/L	U

Data Source: AFCEE, February 2010, MMR-AFCEE Data Warehouse

Key:

BRL = below reporting limit

DL = detection limit

FD1 = field duplicate

J = estimated value

ND = nondetect

N1 = native sample

RL = reporting limit

U = undetected

UJ = estimated undetection

WG = groundwater

WS = surface water

WW = wastewater

µg/L = micrograms per liter

October 7, 2009

To: Rose Forbes, AFCEE

From: Robert Bogert, HGL Project Manager  
Ken Rapuano, HGL Senior Chemist  
Matt Beaupre, Alpha Project Manager  
Scott Enright, Alpha Senior Chemist  
Jim Todaro, Alpha QA Manager

RE: Method 504.1 for 1,2-dibromoethane (EDB): Results not reported to the  
Method Detection Limit (MDL)

---

Alpha Analytical Laboratories (Alpha) conducted a method detection limit (MDL) study in May 2009 prior to receiving samples for analysis by Method 504.1 for 1,2-dibromoethane (EDB). The MDL derived from this study was 0.0032 ug/L (Column A) and 0.0031 ug/L (Column B). These MDL values are sufficiently low to support the EDB reporting limit (RL) of 0.01 ug/L that is required for this project. Both columns are considered to have equal quantitative significance. The project-specific RL was established at 0.01 ug/L. Alpha's routine EDB RL is 0.02 ug/L, and this lower RL was confirmed by the addition of an initial calibration standard at 0.01 ug/L. Detected results should be reported down to the derived column-specific MDLs, unless instructed otherwise, using J qualifiers for results quantitated below the RL.

### ***Summary of Problem***

The EDB results presented in the Alpha data reports from June through August were compared against historical values by CH2M HILL. Historical data for samples for specific sample locations previously indicated routine detections between the RL and MDL whereas the recent data were reported as non-detect (ND). HGL reviewed the chromatograms for a selected project data package, and confirmed EDB peaks were evident for two of the reviewed samples chromatograms for which the reported EDB result was ND. The laboratory was contacted, and acknowledged that the observed peaks were EDB detections that were below the RL and that the data were not properly being reported to the MDL. All laboratory reports for EDB required review to determine if other low level detections were not reported.

### ***Contributing Factors***

Human error by Alpha's bench chemist was the cause of the problem. Prior to conducting the May 2009 MDL study, Alpha's standard RL for 504.1 analysis was 0.020 ug/L. This was also the lowest point of Alpha's standard five-point calibration. Alpha did incorporate a sixth calibration standard of 0.01 ug/L to meet the project required reporting level; however, the analyst failed to take this into account when evaluating the raw data and thus reported the results as if a 0.02 ug/L calibration

point was the lowest available. Since the results for certain samples that Alpha reported as ND were below the typical calibration point, the results were incorrectly reported as ND. This occurred despite communication at the beginning of the project between the laboratory manager and the analyst. This error was not detected by the laboratory quality control review, because the information necessary to correct a false-negative is not available during the normal review process. Similarly, the false-negative could not be caught during data validation without a Level IV review.

#### ***Corrective Action***

All prior lab reports have been re-evaluated to verify if previously reported ND values for EDB (i.e., results reported as “0.01 U”) should have been reported as detected values above the MDL but below the RL. The project team, including the laboratory manager and QA manager, were informed that the correct reporting conventions for low-level detections (below the RL) must be implemented for all previously released reports. Revised reports have been reissued. Pending final review by HGL, the electronic data will be corrected. Table 1 presents a summary of the changes that were made based upon report review..

#### ***Preventative Action***

Alpha will perform a greater level of quality control in reviewing the chromatograms prior to reporting data to ensure that the data reporting conventions have been correctly implemented in the reporting of EDB results. As a final check, HGL will review the chromatograms for all ND results (revised reports and future reports) to screen for possible detections that are not being reported. Alpha has adopted the MMR project specific RL and associated MDL from the May 2009 study as the laboratory standard RL and MDL. This change will minimize the potential for false-negatives due to human error.

#### ***Current Status***

Laboratory reports are have been reviewed by Alpha and transmitted to HGL. HGL has forwarded the revised results to AFCEE and CH2M HILL. The data corrections are summarized in Table 1. HGL is performing a secondary review on all EDB results to verify that no other corrections are required.



## Hilyard, Mark/MMR

---

**From:** Hilyard, Mark/MMR  
**Sent:** Monday, March 22, 2010 9:11 AM  
**To:** Fitzpatrick, Carol/MMR  
**Subject:** FW: HGL Review of EDB Data Packages - Corrective Action Report

-----Original Message-----

From: marchessault.paul@epamail.epa.gov  
[mailto:marchessault.paul@epamail.epa.gov]  
Sent: Friday, October 30, 2009 3:27 PM  
To: Forbes, Rose Civ USAF AFCEE AFCEE/MMR  
Cc: Len Pinaud; Elliot.Jacobs@state.ma.us; Davis, Jon Civ USAF AFCEE AFCEE/MMR; Minior, Mike Civ USAF AFCEE AFCEE/MMR  
Subject: Re: HGL Review of EDB Data Packages - Corrective Action Report

Hi Rose,

I sent this information to Steve DiMattei, and here is his response:

"Looks pretty straight forward to me. Everything included in this memo looks plausible, and there is nothing here that would make me believe that something different happened. In summary, what I get from the memo is that the lab made a mistake by not reporting down to a lower detection limit (due to a lack of internal lab communication), HGL caught the mistake, and the lab admitted that they made a mistake. The lab went back and has corrected the data that was reported "ND" due to an incorrect reporting limit, and now has a plan in place to hopefully stop it from happening again".

Hope that answers your question. Have a great weekend.

Paul N. Marchessault, Remedial Project Manager Federal Facilities Superfund Section  
1 Congress Street, Suite 1100  
Boston, MA 02114  
Phone: (617) 918-1388  
Fax: (617) 918-1291

-----"Forbes, Rose Civ USAF AFCEE AFCEE/MMR" <[Rose.Forbes@brooks.af.mil](mailto:Rose.Forbes@brooks.af.mil)>  
wrote: -----

To: Paul Marchessault/R1/USEPA/US@EPA, "Len Pinaud"  
<[leonard.pinaud@state.ma.us](mailto:leonard.pinaud@state.ma.us)>, <[Elliot.Jacobs@state.ma.us](mailto:Elliot.Jacobs@state.ma.us)>  
From: "Forbes, Rose Civ USAF AFCEE AFCEE/MMR"  
<[Rose.Forbes@brooks.af.mil](mailto:Rose.Forbes@brooks.af.mil)>  
Date: 10/29/2009 08:34AM  
cc: "Davis, Jon Civ USAF AFCEE AFCEE/MMR" <[Jon.Davis@brooks.af.mil](mailto:Jon.Davis@brooks.af.mil)>, "Minior, Mike Civ USAF AFCEE AFCEE/MMR" <[Mike.Minior@brooks.af.mil](mailto:Mike.Minior@brooks.af.mil)>  
Subject: HGL Review of EDB Data Packages - Corrective Action Report

If you recall during the O&M/SPEIM update I gave at the last RPM meeting, I mentioned there were issues with reporting some 504.1 results from Alpha Analytical Lab. The analytical work was performed correctly but there was a mistake in the way the chemist

reported some results. The attached corrective action report describes the issue and subsequent response in more detail and also provides a table of the impacted results.

Please let me know if you have any questions or require additional information.

Thanks

Rose

Rose Forbes, P.E.  
HQ AFCEE/MMR  
322 East Inner Road  
Otis ANG Base MA 02542  
Work: 508-968-4670 x 5613  
Fax: 508-968-4476  
Cell: 210-324-9495  
[rose.forbes@brooks.af.mil](mailto:rose.forbes@brooks.af.mil)


[attachment "504 1 EDB Corrective Action\_Final.pdf" removed by Paul Marchessault/R1/USEPA/US]


# **ATTACHMENT D**

## **FS-28 Project Notes**


**Fuel Spill-28 2009 Triennial SPEIM Data Presentation  
(January through September 2009)**  
**[389849-SPEIM-FS28-PRJNOT-001](#)**

**Coonamesett Water Supply Well (CWSW) Sentry Well Sampling Optimization**  
**[389849-SPEIM-FS28-PRJNOT-002](#)**


  <b>AFCEE</b> <b>SPEIM/LTM/O&amp;M</b> <b>Otis ANG Base, Massachusetts</b> <b>AFCEE 4P08 FA8903-08-D8769-0148</b>	<b>PROJECT NOTE</b>		TASK ORDER 0148
			PROJECT NO. 389849
	DOCUMENT CONTROL NUMBER: <b>389849-SPEIM-FS28-PRJNOT-001</b>		PAGE 1 OF 5
		CDRL B008	

Confirmation Of: <input checked="" type="checkbox"/> Meeting <input type="checkbox"/> Change Notice <input type="checkbox"/> General Project Note	Date Held: 16 September 2009 Location: Large IRP Conference Room Date Issued: 25 February 2010 Recorded By: Nigel Tindall
Subject:  <b>FUEL SPILL-28 2009 TRIENNIAL SPEIM DATA PRESENTATION (JANUARY THROUGH SEPTEMBER 2009)</b>	Issued By: Patricia de Groot   CH2M HILL PROGRAM MANAGER


ITEM	REMARKS
<b>1.0</b>	<b>INTRODUCTION</b>  <p>This project note summarizes the Fuel Spill-28 (FS-28) plume data presentation which included data collected for the FS-28 System Performance and Ecological Impact Monitoring (SPEIM) program between January and September 2009. Data presented included the results of a triennial groundwater sampling event (March - June 2009), surface water sampling (May, July, and September 2009), and monthly treatment plant sampling (January through June 2009). These data were presented to the regulatory agencies during the 16 September 2009 Technical Update meeting. The handout for the presentation, including text slides and 13 figures, is included as Attachment A.</p>
<b>2.0</b>	<b>BACKGROUND</b>  <p>The FS-28 plume is defined as the extent of groundwater contaminated with the contaminant of concern (COC) ethylene dibromide (EDB) at concentrations exceeding the Massachusetts Maximum Contaminant Level (MMCL) of 0.02 micrograms per liter (µg/L). The FS-28 EDB plume is being remediated through the operation of the FS-28 extraction, treatment, and discharge (ETD) system (Figure 1 in Attachment A). At the time of this data presentation (September 2009), the ETD system was extracting contaminated groundwater using two remedial system components at a combined flow rate of 600 gallons per minute (gpm). The flows to the treatment plant are as follows: (1) extraction well 69EW0001 operates at a flow rate of 550 gpm; and (2) extraction well 69EW0002 operates at a flow rate of 50 gpm. This optimized operational condition at FS-28, referred to as 2008Scenario01, is discussed in more detail in the <i>Fuel Spill-28 2008 Extraction, Treatment, and Discharge System and SPEIM Network Optimization</i> project note (AFCEE 2009a).</p>

	<b>PROJECT NOTE</b>	TASK ORDER 0148
		PROJECT NO. 389849
<b>AFCEE</b> <b>SPEIM/LTM/O&amp;M</b> <b>Otis ANG Base, Massachusetts</b> <b>AFCEE 4P08 FA8903-08-D8769-0148</b>	<b>DOCUMENT CONTROL NUMBER:</b> <b>389849-SPEIM-FS28-PRJNOT-001</b>  <b>CDRL B008</b>	PAGE 2 OF 5

ITEM	REMARKS
	<p>The third component of the FS-28 remedial system, the shallow well points (SWP), which are located to the south of 69EW0001 (Figure 1 in Attachment A), were shutdown on an interim basis in December 2008 while a data gap investigation was conducted in this area. This investigation was completed to provide data to support an optimization evaluation that assessed whether the SWP system could be effective in remediating the remnants of the EDB plume in this area. The results of the SWP data gap investigation and optimization evaluation are presented in the triennial data presentation (Attachment A) and summarized in section 3.0 of this project note.</p>
<b>3.0</b>	<p><b>RESULTS</b></p> <p>During the data presentation, analytical results and concentration trend graphs were presented for select wells that are monitored throughout the FS-28 plume (Attachment A). Monitoring results were presented for: (i) the main EDB plume located upgradient (i.e., north) of 69EW0001; (ii) the deep leading edge lobe of the FS-28 EDB plume; and (iii) the shallow leading edge lobe. In addition, cross-sectional representations of the FS-28 plume were updated using the triennial sampling event dataset and presented. No EDB was detected in surface water samples collected in the Coonamessett River and cranberry bog area during 2009; therefore no cranberry sampling was required.</p> <p>A review of the SWP data gap assessment and optimization evaluation that was conducted between July 2008 and March 2009 was presented. Activities associated with this effort included:</p> <ul style="list-style-type: none"> <li>• Sampling of existing available monitoring wells, piezometers, &amp; surface water locations.</li> <li>• Optimization flow testing under several differing SWP operational configurations.</li> <li>• Shallow groundwater sampling using push-points within the footprint of the SWPs and nearby bog ditches to update the characterization of the zone of upwelling.</li> <li>• Interim shutdown of SWP system in December 2008 while additional data were collected.</li> <li>• Groundwater vertical profiling using direct push rig at three locations.</li> <li>• Installation and sampling of two new monitoring wells.</li> </ul> <p>Based on the results of the data gap investigation and optimization evaluation, it was concluded that:</p> <ul style="list-style-type: none"> <li>• Residual EDB concentrations remain in groundwater in the area to the north of the SWPs.</li> <li>• The area of residual contamination is limited in extent and concentrations are relatively low (i.e., less than 0.1 µg/L).</li> <li>• The SWP system is no longer effective at remediating the remnants of the EDB groundwater contamination in this area.</li> </ul>

	<b>PROJECT NOTE</b>	TASK ORDER 0148
		PROJECT NO. 389849
<b>AFCEE</b> <b>SPEIM/LTM/O&amp;M</b> <b>Otis ANG Base, Massachusetts</b> <b>AFCEE 4P08 FA8903-08-D8769-0148</b>	<b>DOCUMENT CONTROL NUMBER:</b> <b>389849-SPEIM-FS28-PRJNOT-001</b>  <b>CDRL B008</b>	PAGE 3 OF 5

ITEM	REMARKS
	<p>An overview of ETD system performance for the reporting period was also presented by providing treatment plant influent concentrations, EDB mass removal, volume of groundwater treated, frequency of carbon exchanges, extraction well operational rates, details related to the installation of a packer at 69EW0001 in June 2009, and air emissions associated with the operation of the system.</p> <p>Chemical and hydraulic data for the FS-28 plume have been collected through the SPEIM program since startup of the treatment system in 1997. This program was developed to monitor plume changes and to ensure the effective operation of the groundwater remediation systems; monitoring networks are also evaluated and optimized through the SPEIM program. The current approved FS-28 SPEIM monitoring network, including analytical scope and methods, is presented in the <i>Comprehensive Long Term Monitoring Plan</i> (CLTMP) which is available on-line at <a href="http://www.mmr.org">www.mmr.org</a> under Plans and Protocols.</p> <p>Note that all the analytical data collected in 2008 for the FS-28 SPEIM program were reported in the <i>Fuel Spill-28 2008 Summary Letter Report</i> (AFCEE 2009b) and the data collected in 2009 will be included in the <i>Fuel Spill-28 2009 Summary Letter Report</i> scheduled for submittal in March 2010.</p>
<b>4.0</b>	<p><b>CONCLUSIONS/RECOMMENDATION</b></p> <p><b>Conclusions</b></p> <p>Based on the SPEIM data summarized in the data presentation, the following conclusions can be drawn:</p> <ul style="list-style-type: none"> <li>• The FS-28 SPEIM data support the conclusion that the remedial goals of the system are being met and the FS-28 plume cleanup is progressing as expected. In addition, these most recent SPEIM data support the FS-28 conceptual site model.</li> <li>• A continued decline in EDB concentrations in the main body of the FS-28 EDB plume support an updated depiction of the FS-28 plume boundary (Figure 4 in Attachment A).</li> <li>• The maximum detected EDB concentration in the main body of the FS-28 plume is now 1.38 µg/L at 69MW1284B (declining from 2.54 µg/L in April 2007 at 69MW1283B and 2.89 µg/L in April 2006 at 69MW1284B).</li> <li>• Monitoring data collected at the 69MW1303 well cluster continue to indicate capture of the main EDB plume through the operation of 69EW0001.</li> <li>• Monitoring data indicate continued downgradient migration of the deep leading edge plume lobe and an overall decline in EDB concentrations.</li> </ul>

	<b>PROJECT NOTE</b>	TASK ORDER 0148
		PROJECT NO. 389849
<b>AFCEE</b> <b>SPEIM/LTM/O&amp;M</b> <b>Otis ANG Base, Massachusetts</b> <b>AFCEE 4P08 FA8903-08-D8769-0148</b>	<b>DOCUMENT CONTROL NUMBER:</b> <b>389849-SPEIM-FS28-PRJNOT-001</b>  <b>CDRL B008</b>	PAGE 4 OF 5

ITEM	REMARKS
	<ul style="list-style-type: none"> <li>No EDB MMCL exceedances were detected in wells selected to monitor the shallow leading edge plume lobe; therefore, it is no longer possible to depict the shallow lobe.</li> <li>No EDB was detected in surface water samples collected in May, July, and September 2009 from the Coonamessett River and associated cranberry bogs; therefore, no cranberry sampling was needed in 2009.</li> <li>The SWP system is no longer effective at remediating the remnants of the EDB plume in this area and the system should be permanently shutdown; two wells (69MW0033A and 69MW0034A) will be added to the SPEIM network to monitor the attenuation of the remnants of the plume in this area.</li> </ul> <p><b>Recommendations</b></p> <p>Recommendations are as follows:</p> <ul style="list-style-type: none"> <li>Update the FS-28 plume boundary as depicted on Figure 13 in Attachment A.</li> <li>The SWP system should be permanently shutdown because it is no longer effective in remediating the remnants of the EDB plume in this area. A decision to decommission the SWP system will be based on the results of the next SPEIM annual sampling event scheduled for January 2010. This new operational condition for the FS-28 ETD system will be referred to as 2009Scenario01. Extraction wells 69EW0001 and 69EW0002 will continue to be operated and 550 gpm and 50 gpm, respectively, under operational condition 2009Scenario01.</li> <li>Monitoring wells 69MW0033A and 69MW0034A are to be added to the FS-28 SPEIM chemical network for annual monitoring for EDB.</li> <li>Continue with all planned SPEIM activities including: <ul style="list-style-type: none"> <li>Semiannual sampling (August 2009) and annual sampling (January 2010) SPEIM events.</li> <li>Coonamessett Water Supply Well sentry well sampling program. (Note that this sentry well sampling program is currently undergoing an optimization evaluation that is expected to be implemented during 2010).</li> <li>Routine monthly remedial system performance monitoring.</li> </ul> </li> </ul> <p>The revised SPEIM chemical monitoring network is summarized in Figure B-1 and Table B-1 which are provided in Attachment B. The updated FS-28 plume boundary is also shown on Figure B-1 in Attachment B.</p>



# PROJECT NOTE

TASK ORDER  
0148

PROJECT NO.  
389849

AFCEE  
SPEIM/LTM/O&M  
Otis ANG Base, Massachusetts  
AFCEE 4P08 FA8903-08-D8769-0148

DOCUMENT CONTROL NUMBER:  
389849-SPEIM-FS28-PRJNOT-001  
CDRL B008

PAGE 5 OF 5

ITEM	REMARKS
------	---------

## 5.0 REGULATOR COMMENTS/ACTION ITEMS

No comments or concerns were received from the regulators on the information presented during the FS-28 2009 Triennial Data Presentation on 16 September 2009 or at the follow up Technical Update meeting on 09 December 2009.

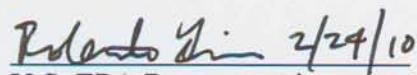
## 6.0 REFERENCES


AFCEE (Air Force Center for Engineering and the Environment). 2009a (March). Project Note: *Fuel Spill – 28 2008 Extraction, Treatment, and Discharge System and SPEIM Network Optimization*. 371335-SPEIM-FS28-PRJNOT-002. Prepared by CH2M HILL for AFCEE/MMR, Installation Restoration Program, Otis Air National Guard Base, MA.

\_\_\_\_\_. 2009b (March). *Fuel Spill-28 2008 Summary Letter Report*. 371335-SPEIM-FS-28-SLR-001. Prepared by CH2M HILL for AFCEE/MMR, Installation Restoration Program, Otis Air National Guard Base, MA.

## 7.0 CONCURRENCE

Concurrence with the FS-28 SPEIM chemical monitoring network revisions and updated plume boundary (Attachment B); and the recommendation to permanently shutdown the SWP system is represented by the signatures below:

  
U.S. EPA Representative

 2/24/2010  
MassDEP Representative

 24 Feb 10  
AFCEE Project Manager

Note: The parties involved will retain the ability to modify monitoring program based on field observations or other mutually agreeable technical justifications.

### Attachments:

Attachment A. FS-28 2009 Triennial SPEIM Data Presentation, 16 September 2009 Technical Update Meeting

Attachment B. FS-28 SPEIM Chemical Network (Figure B-1 and Table B-1)



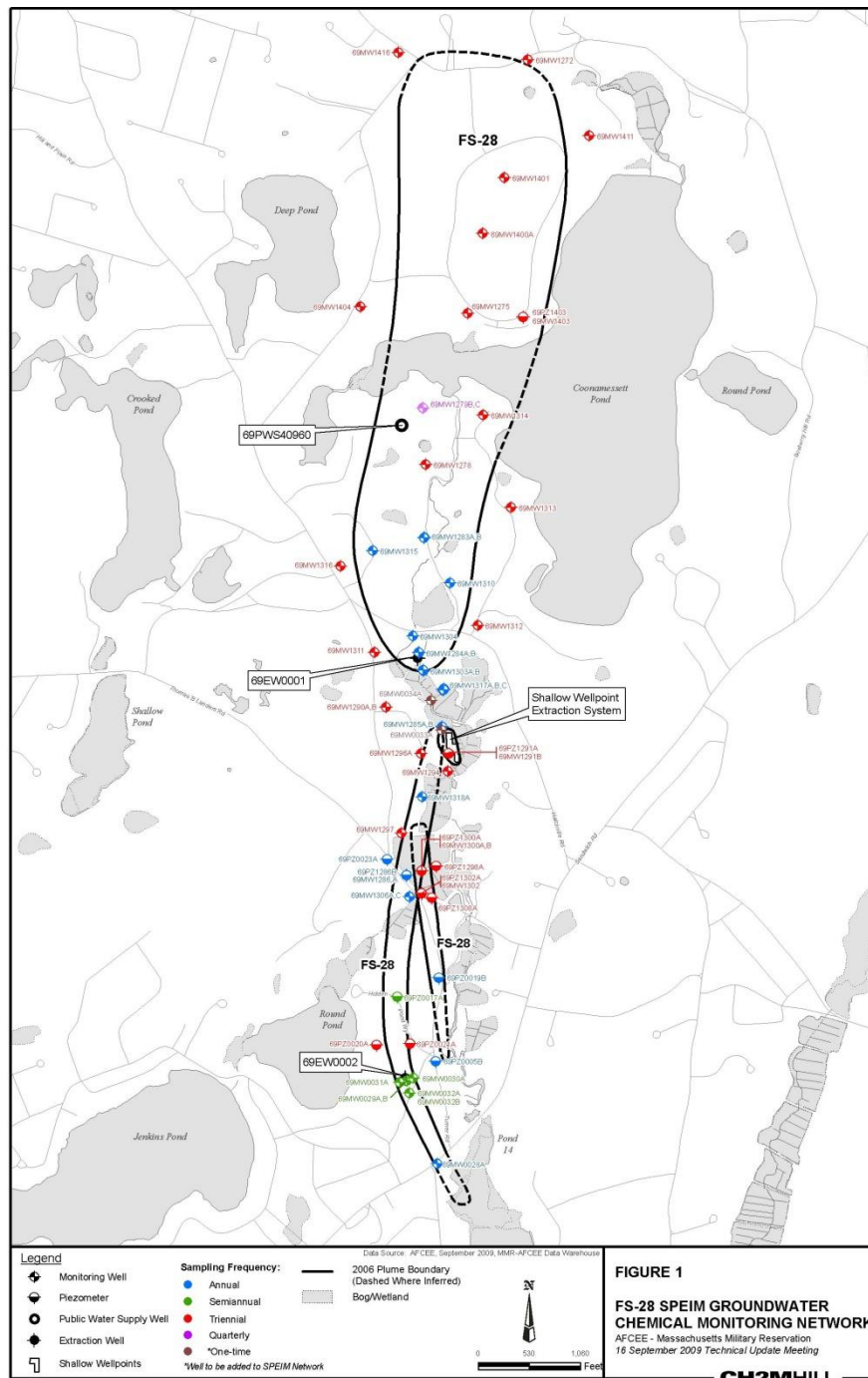
## **ATTACHMENT A**

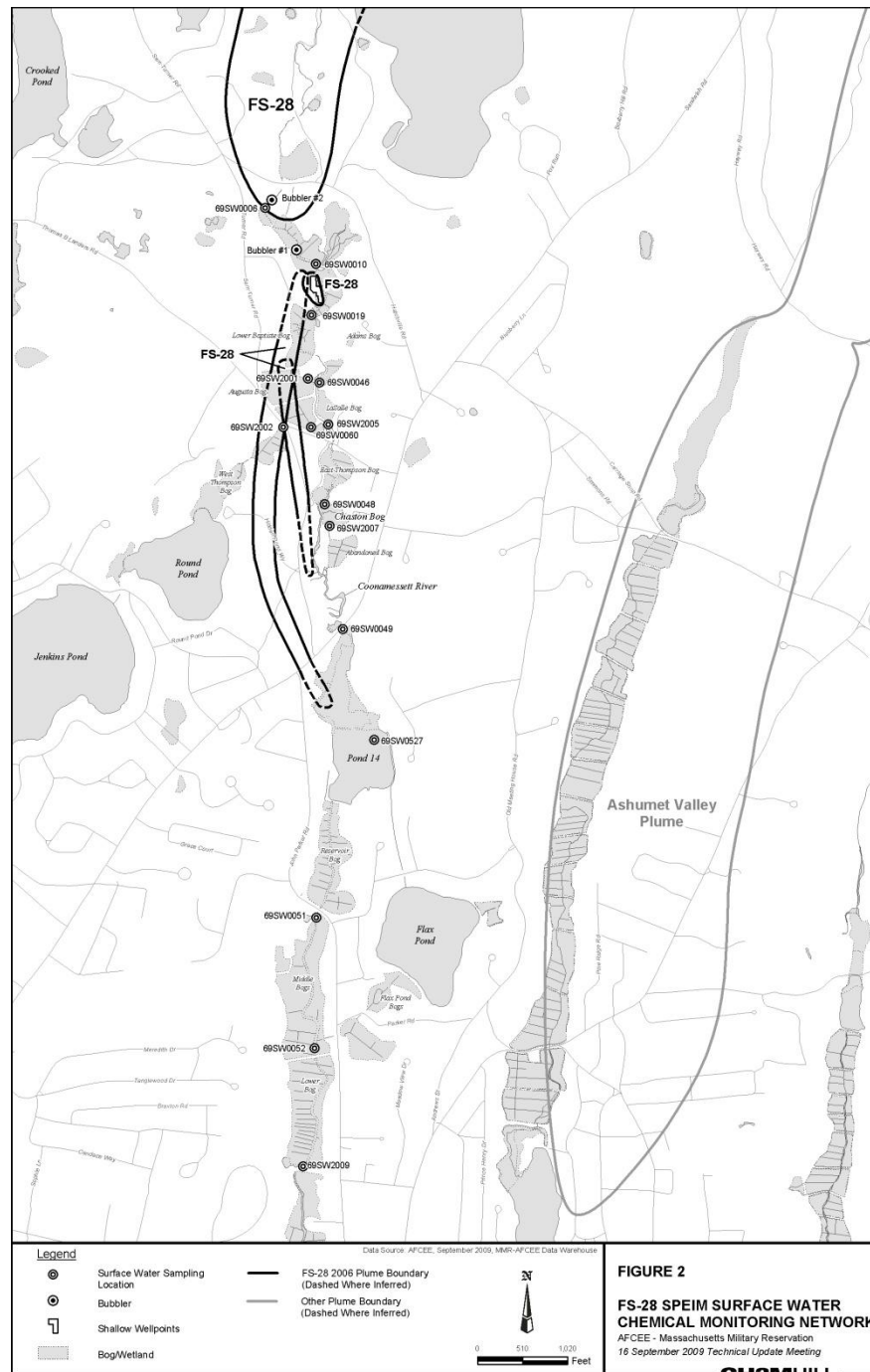
# **FS-28 Triennial SPEIM Data Presentation**

**16 September 2009 Technical Update Meeting**

## **Overview**

- Groundwater sampling results for March-June 2009  
(locations shown on Figure 1)
- 66 monitoring wells sampled for EDB analysis
  - 31 triennial
  - 24 annual
  - 7 semiannual
  - 2 quarterly
  - 2 new wells (to be added to SPEIM network)
- Surface water sampling at Coonamessett River locations for EDB analysis (May, July, and September 2009)  
(locations shown on Figure 2)
- Summary of Shallow Wellpoint Investigation Findings
- ETI System Performance Monitoring (January – June 2009)
- No Sampling Deviations





# FS-28 Triennial SPEIM Data Presentation

## Groundwater Highlights

### **Main EDB Plume** (Distant from 69EW0001 and Trailing Edge – Figure 3a)

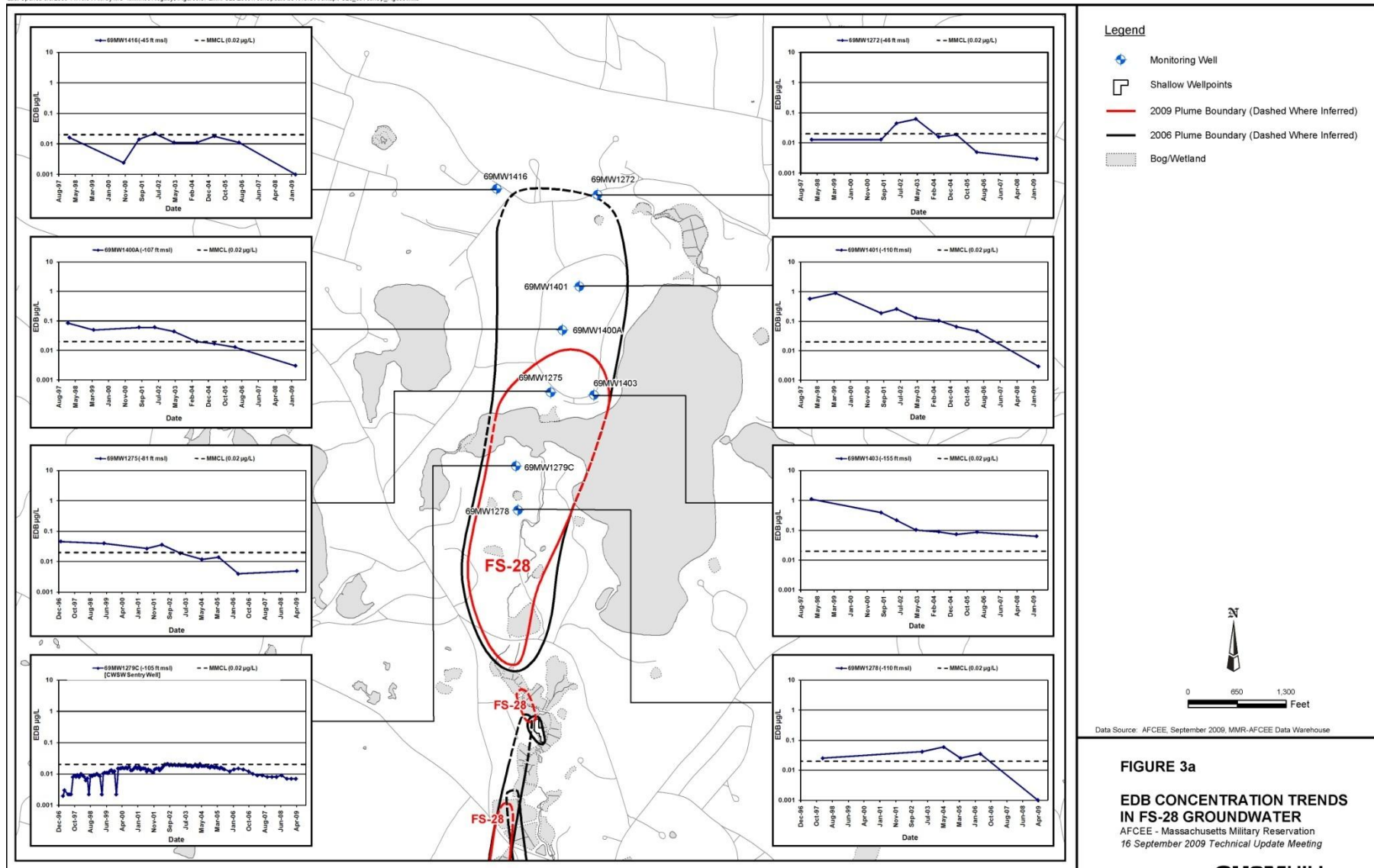
- Continued declining trend in EDB concentrations due to attenuation
- Evidence that trailing edge now 2,500 feet south of prior 2006 depiction
- 69MW1403 northernmost well with EDB MMCL exceedance

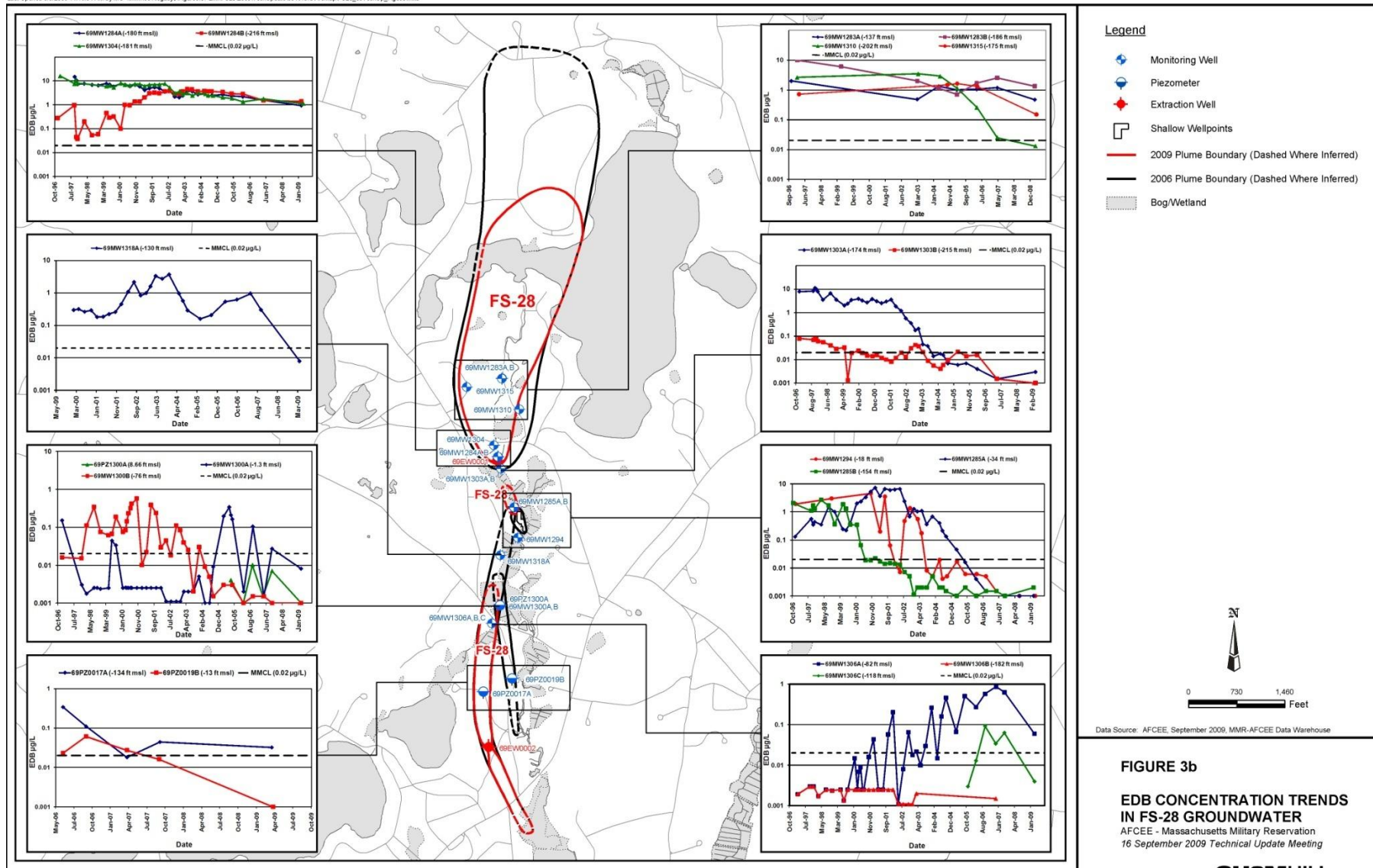
### **Main EDB Plume** (Immediately north of 69EW0001 – Figure 3b)

- Reductions at key indicator wells in core of plume near 69EW0001

Monitoring Well LOC ID	EDB Concentration (µg/L)		
	April 2006	April 2007	March 2009
69MW1283A	1.05	1.18	0.464
69MW1283B	1.68	2.54	1.33
69MW1284A	2.19	1.56	0.931
69MW1284B	2.89	1.53	1.38
69MW1304	1.35	1.79	1.13
69MW1310	0.256	0.025	0.013
69MW1315	1.3	NS	0.148

- Data at 69MW1303A and B continue to indicate plume capture by 69EW0001







# **FS-28 Triennial SPEIM Data Presentation**

## **Groundwater Highlights (cont.)**

### **Deep Leading Edge EDB Lobe (Figure 3b)**

- Highest EDB concentrations historically seen at 69MW1318A; decline from 0.303 µg/L in Sept 07 to BRL in April 09 (and maximum concentration of 3.7 µg/L in Dec 03)
- Declining trend may indicate trailing edge is now located south of 69MW1318A
- Decreases in EDB concentrations also seen at 69MW1306 cluster and 69PZ0017A

### **Shallow Leading Edge EDB Lobe (Figure 3b)**

- Shallow lobe previously defined by MMCL exceedances at 69MW1300A and 69PZ0019B; EDB concentrations now below MMCL
- Shallow lobe can no longer be delineated using current monitoring data

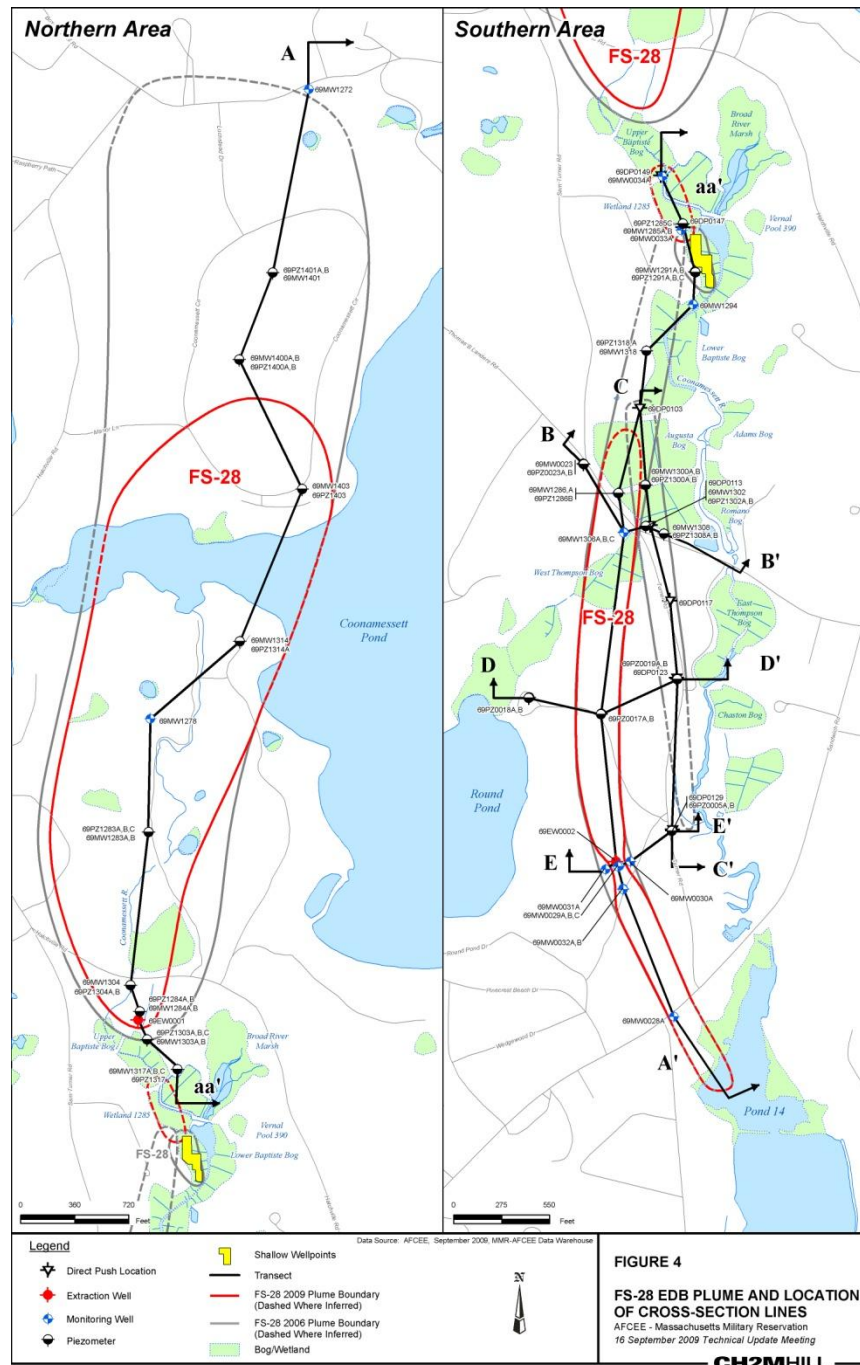
### **REVIEW UPDATED CROSS SECTIONS – Figures 4 through 10**

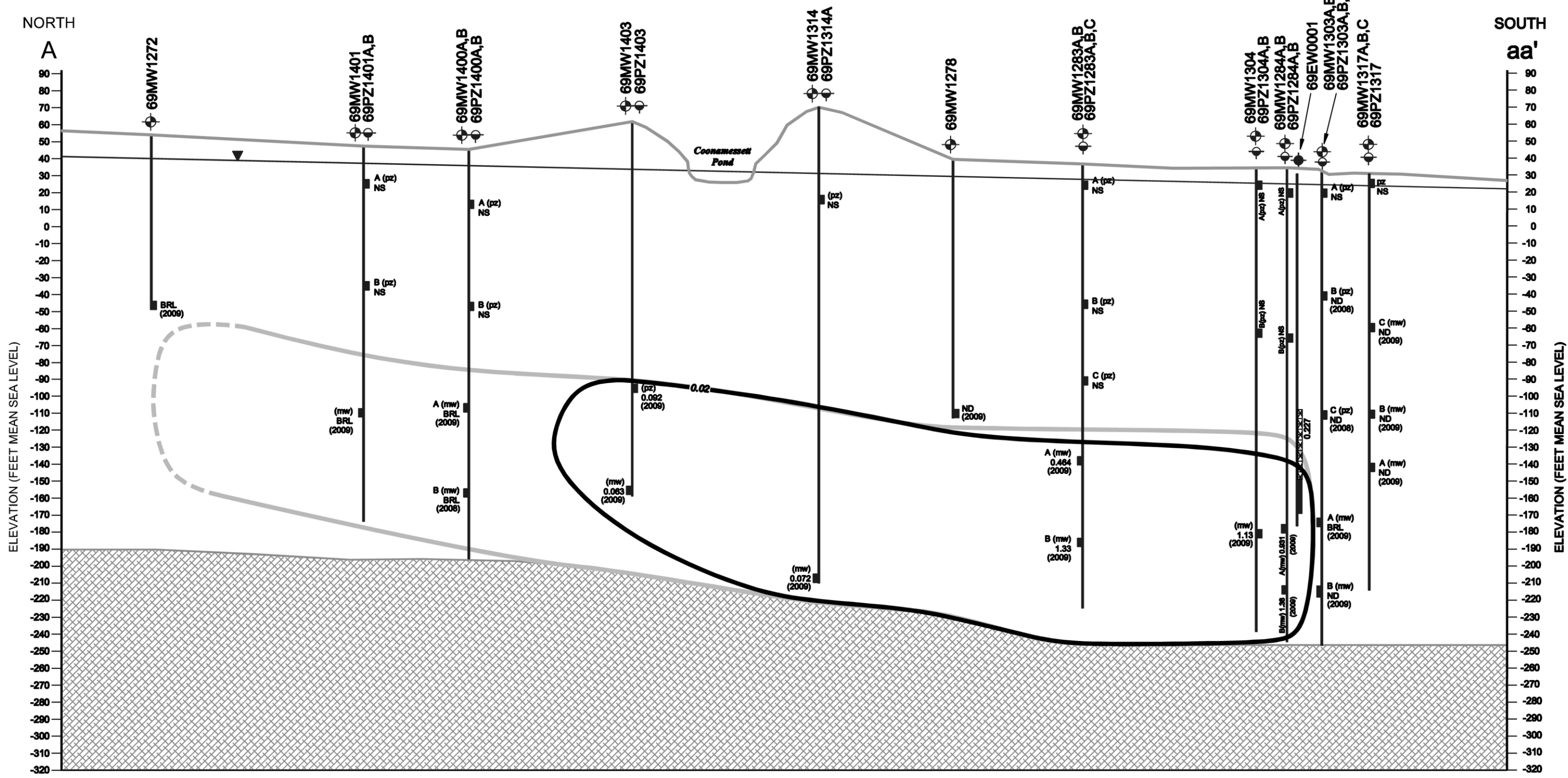
## **Surface Water Highlights**

- No EDB detected in any surface water samples collected during May, July and September\* 2009 monitoring events.

\* Data unvalidated







**Legend**

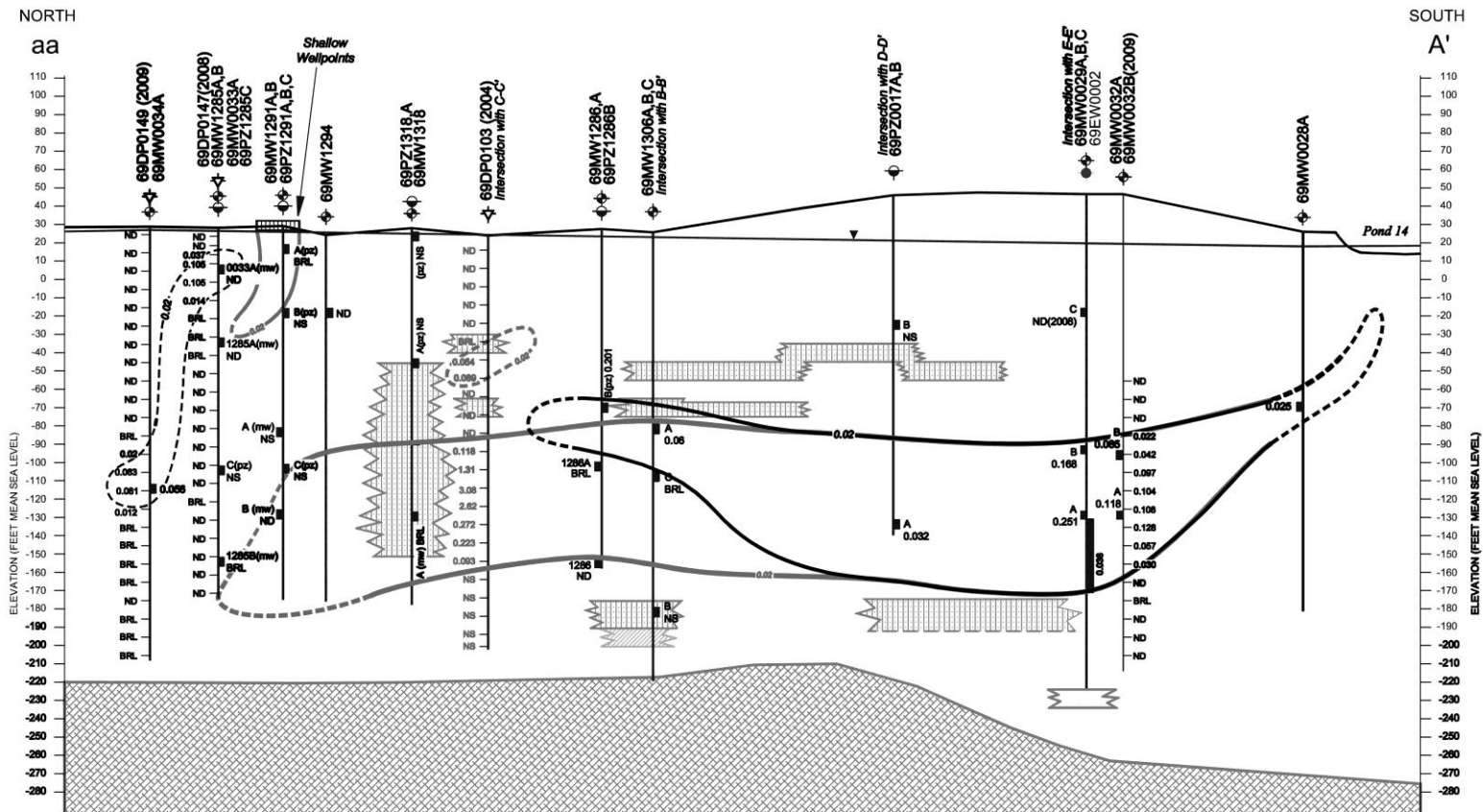
- Monitoring Well
- Well screen ID
- Extraction Well
- Piezometer
- BRL: Below Reporting Limit
- ND: Nondetect
- NS: Not Sampled
- Water table
- Monitoring Well EDB Results (µg/L) (Latest Available Data)
- 2009 Plume Boundary (MMCL = 0.02 µg/L)
- 2006 Plume Boundary (Dashed Where Inferred) (MMCL = 0.02 µg/L)
- Bedrock
- Screen Closed (Packer)

**NOTES:** Monitoring well and piezometer data are from most recent sampling event.

**Scale:** 0 to 600 Feet

**Data Source:** AFCEE, September 2009, MMR-AFCEE Data Warehouse.

**FIGURE 5**  
**FS-28 CROSS-SECTION A - aa'**  
AFCEE - Massachusetts Military Reservation  
09 December 2009 MMRCT Meeting



#### Legend

- Monitoring Well
- Piezometer
- Extraction Well
- Direct Push Location
- Water Table

- A Well Screen ID
- NS Not Sampled
- ND Nondetect
- NR Not Representative
- BRL Below Reporting Limit

- 0.02 2009 Plume Boundary (Dashed Where Inferred) (MMCL = 0.02 µg/L)
- 0.02 2006 Plume Boundary (Dashed Where Inferred) (MMCL = 0.02 µg/L)
- 0.182 Monitoring Well EDB Results (µg/L) (Latest Available Data)

- 1.14 Direct Push EDB Screening Data (µg/L)
- Clay
- Silty Sand

- Silt
- Bedrock

Data Source: AFCEE, September 2006, MMR AFCEE Data Warehouse

NOTE: Lithology at direct push locations is inferred from pump water observations. Date of borehole screening data is noted on figure.

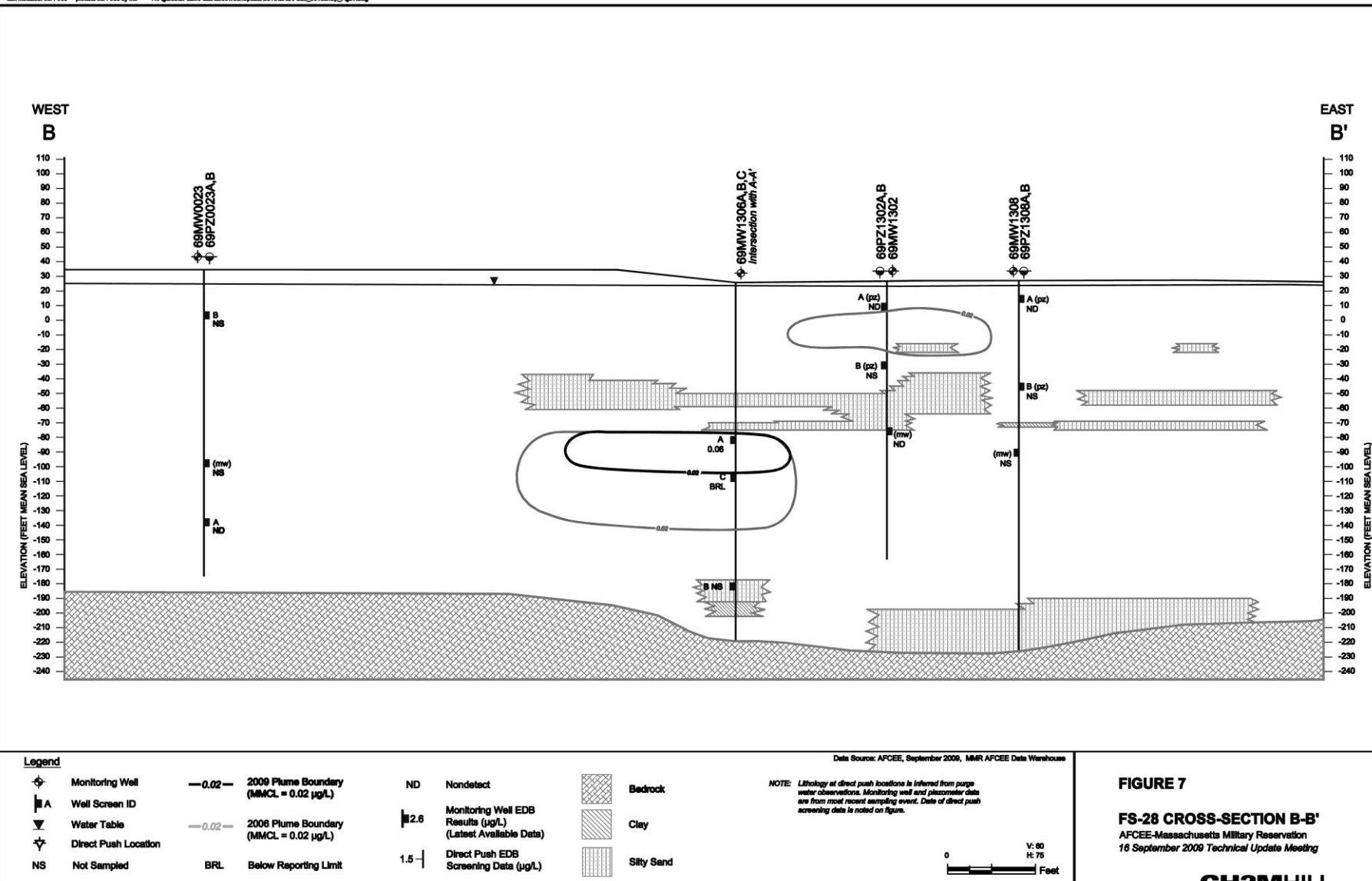
0 V: 60  
H: 400  
Feet

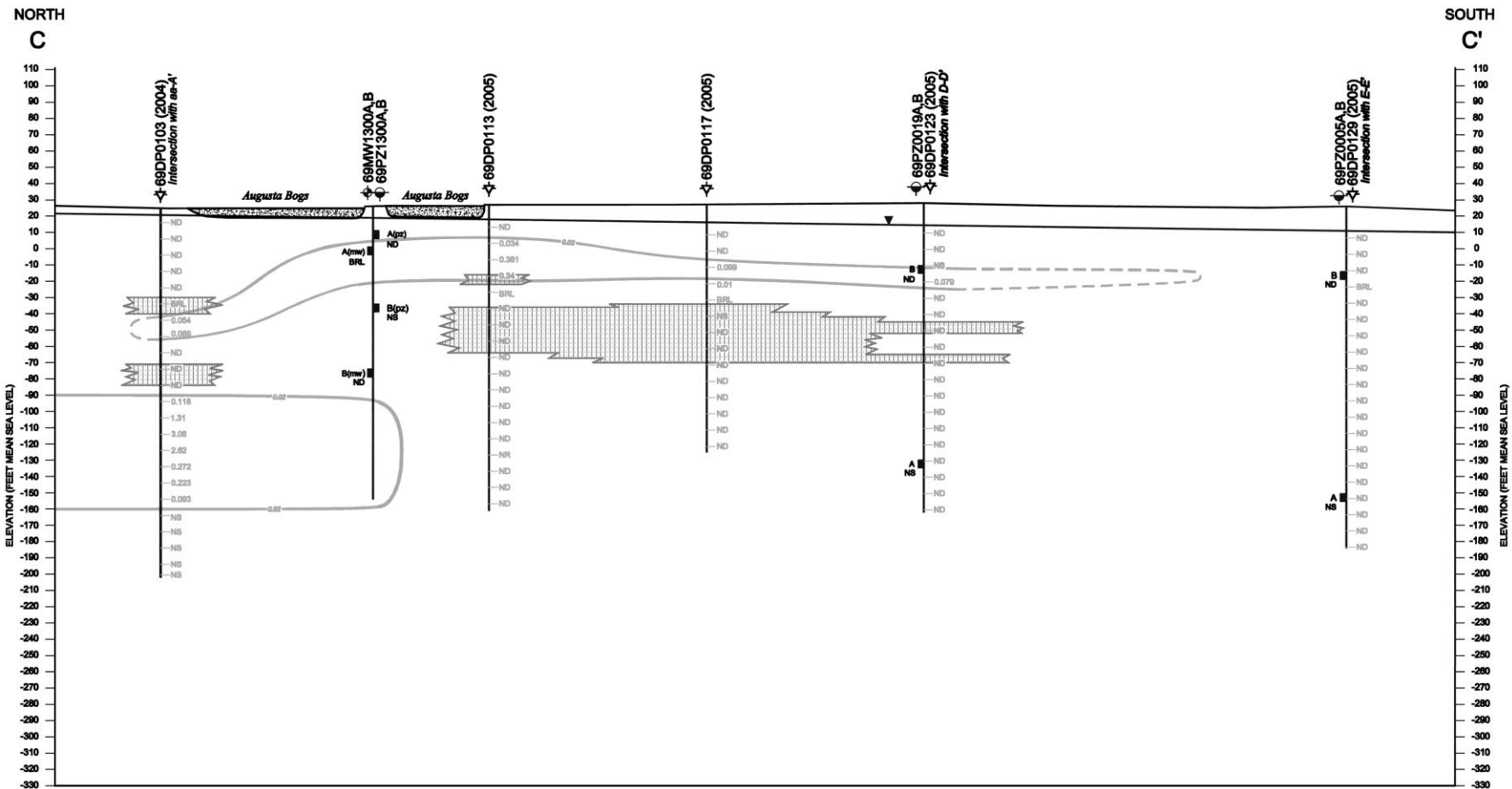
**FIGURE 6**

**FS-28 CROSS-SECTION aa'-A'**

AFCEE-Massachusetts Military Reservation  
16 September 2009 Technical Update Meeting

**CH2MHILL**





**Legend**

- |  |                      |    |  |     |  |
|--|----------------------|----|--|-----|--|
|  | Monitoring Well      |    | Piezometer   | ND  | Nondetect  |
|  | Well Screen ID       |    | 2006 Plume Boundary<br>(Dashed Where Inferred)<br>(MMCL = 0.02 µg/L) | 1.5 | Historic Direct Push EDB<br>Screening Data (µg/L)                |
|  | Water Table          |    | Direct Push Location   | 2.6 | Monitoring Well<br>EDB Results (µg/L)<br>(Latest Available Data) |
|  | Direct Push Location | NS | Not Sampled  |     |  |

Silty Sand

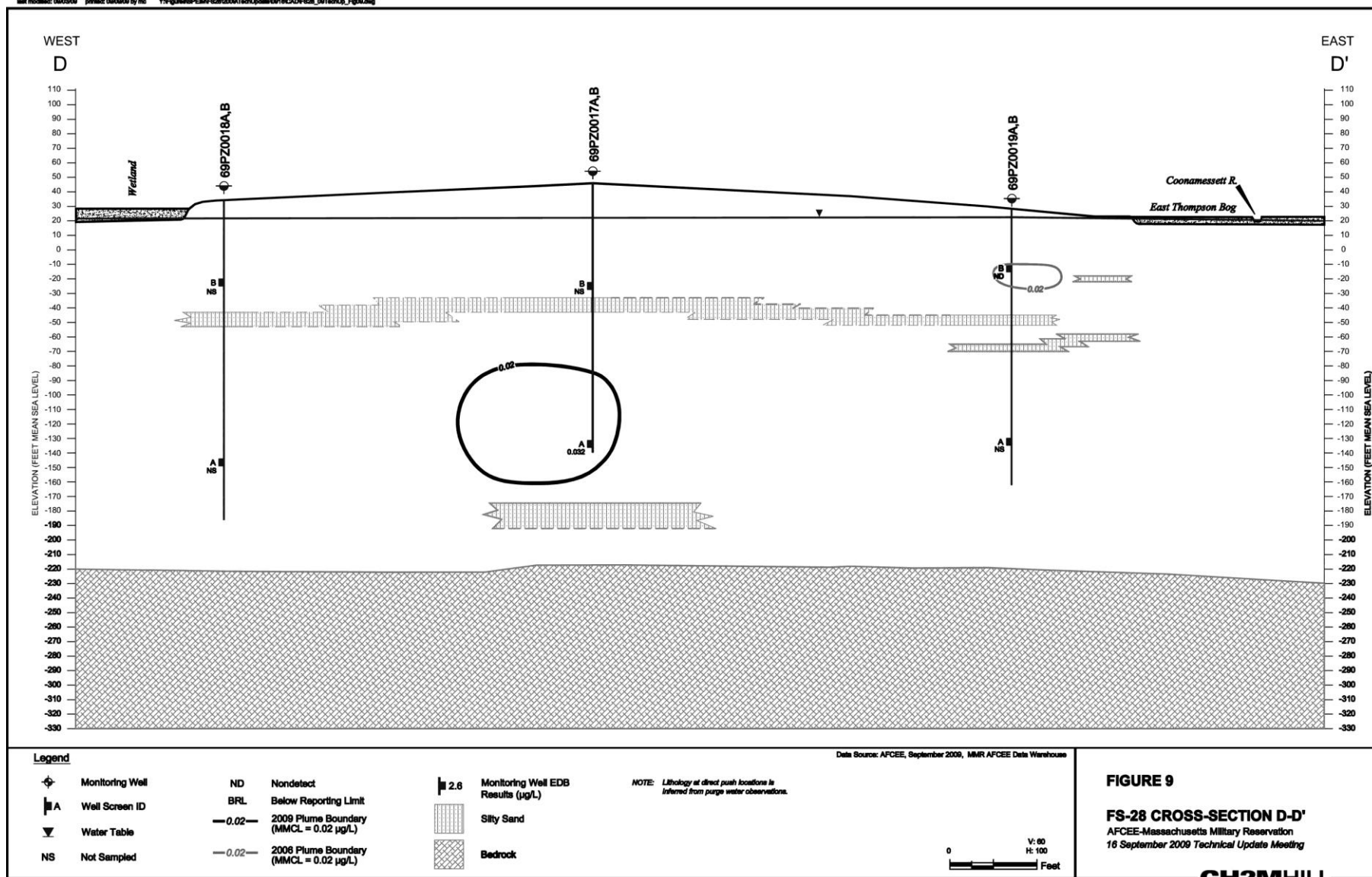
NOTE: Lithology at direct push locations is inferred from purge water observations. Monitoring well and piezometer data are from most recent sampling event. Date of direct push screening data is noted on figure.

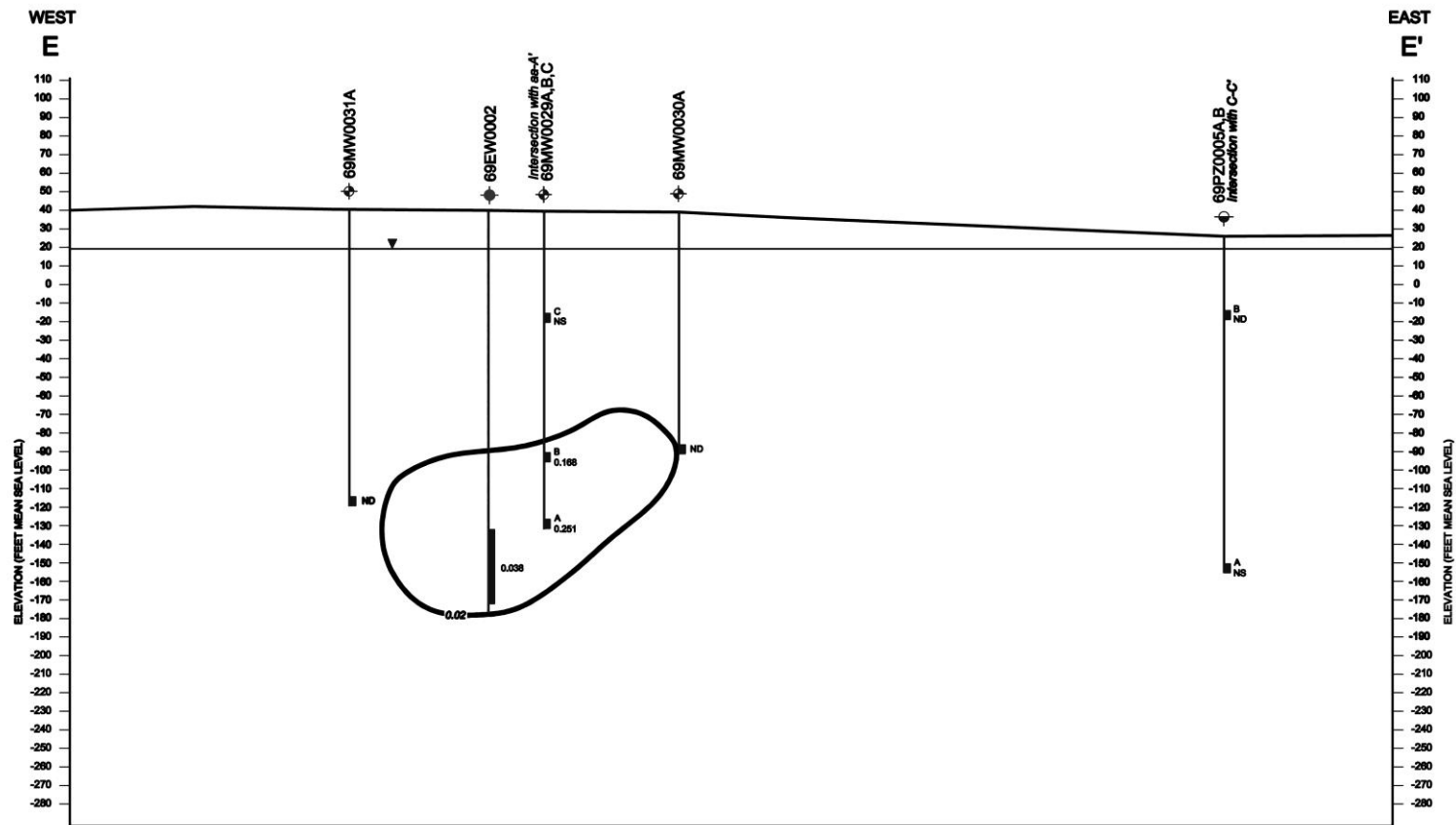
0 V: 60  
H: 200  
Feet

**FIGURE 8**

**FS-28 CROSS-SECTION C-C'**  
AFCEE-Massachusetts Military Reservation  
16 September 2009 Technical Update Meeting

**CH2MHILL**





**Legend**

	Monitoring Well		Well Screen ID		2009 Plume Boundary (MMCL = 0.02 µg/L)
	Piezometer		Not Sampled		Monitoring Well EDB Results (µg/L) (Latest Available Data)
	Extraction Well		Nondetect		
	Water Table		Below Reporting Limit		

Data Source: AFCEE, September 2006, MMR AFCEE Data Warehouse



**FIGURE 10**

**FS-28 CROSS-SECTION E-E'**  
AFCEE-Massachusetts Military Reservation  
16 September 2009 Technical Update Meeting

**CH2MHILL**

# FS-28 Triennial SPEIM Data Presentation

## Review of Shallow Well Point Evaluation

- The objectives of the shallow well point (SWP) data gap investigation and optimization testing performed between July 2008 and March 2009 were to:
  1. characterize the extent of the residual EDB contamination in groundwater upwelling in the area of the SWPs; and
  2. determine whether the SWP remedial system can be effective at capturing the residual EDB contamination in this area.
- The following activities were completed:
  - Sampling of existing available monitoring wells, piezometers, & surface water locations
  - Optimization flow testing under several differing SWP operational configurations
  - Shallow groundwater sampling using push-points within the footprint of the SWPs and nearby bog ditches to update the characterization of the zone of upwelling
  - Interim shutdown of SWP system in December 2008
  - Groundwater vertical profiling using direct push rig at three locations (69DP0147 through 69DP0149)
  - Installation and sampling of two new monitoring wells (69MW0033A and 69MW0034A) –  
Figure 11





# **FS-28 Triennial SPEIM Data Presentation Review of Shallow Well Point Evaluation**

## **Conclusions**

- Residual EDB concentrations remain in groundwater in the area to the north of the SWPs.
- The area of residual contamination is limited in extent and concentrations are relatively low (i.e., less than 0.1 µg/L)
  - 69MW0033A sampled on 05 June 2009 – No EDB detected
  - 69MW0034A sampled on 05 June 2009 – EDB detected at 0.056 µg/L
- Based on the results of the data gap investigation and the optimization flow testing, it is apparent that the SWP system is no longer effective at remediating the remnants of the EDB groundwater contamination in this area

## **Recommendations**

- Permanently shut down the SWP system
- Monitor the attenuation of the remnants of the EDB contamination in the area of the SWPs annually by adding monitoring wells 69MW0033A<sub>17</sub> and 69MW0034A to the FS-28 SPEIM chemical network

# FS-28 Triennial SPEIM Data Presentation

## FS-28 Remedial System Operational Summary

### – Operational Period (January 2009 – June 2009):

- Approximately 142 million gallons of groundwater treated
- 3 carbon exchanges (15 January, 17 March, and 07 May 2009)
- Electrical usage and related air emissions:

#### Electrical Usage

(Jan '09 – June '09)

197 MWh

#### Related Air Emissions

(Jan '09 – June '09)

166 tons CO<sub>2</sub>

248 lbs NO<sub>x</sub>

201 lbs SO<sub>2</sub>

12 lbs VOC

8 lbs PM10

#### Electrical Usage

(System startup (Oct '97) – June '09)

6,203 MWh

#### Related Air Emissions

(System startup (Oct '97) – June '09)

5,211 tons CO<sub>2</sub>

7,815 lbs NO<sub>x</sub>

6,328 lbs SO<sub>2</sub>

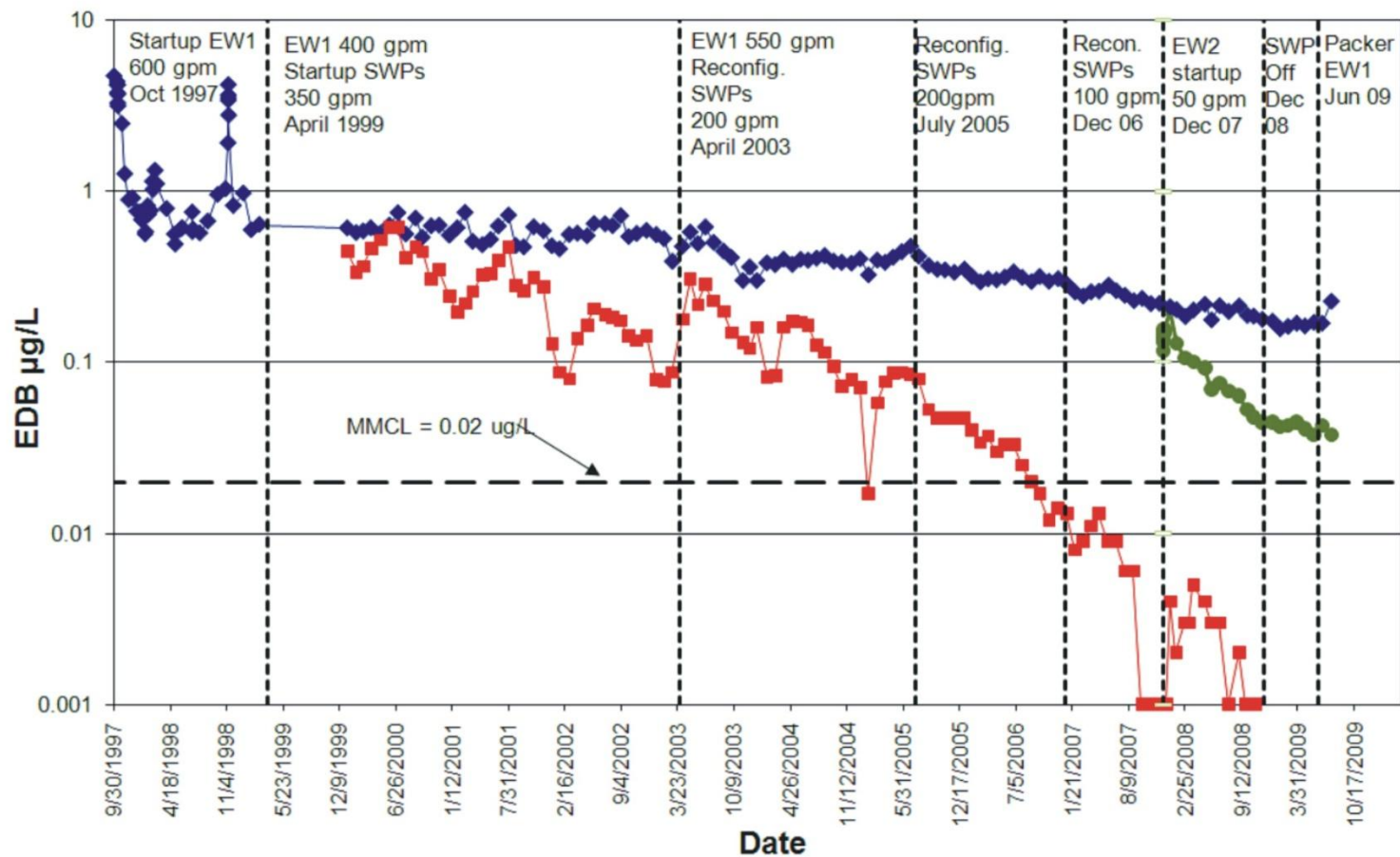
366 lbs VOC

248 lbs PM10

# FS-28 Triennial SPEIM Data Presentation

## FS-28 Remedial System Performance Monitoring Data – Figure 12 (Jan 09 – June 09)

- 69EW0001 influent EDB concentrations ranged from 0.157 to 0.170 µg/L.
- 69EW0001 optimized through installation of a packer in June 2009 which resulted in a 35% increase in influent EDB concentration (0.170 µg/L in June 2009 prior to packering to 0.227 µg/L on 27 July 2009)
- 69EW0002 influent EDB concentrations ranged from 0.038 to 0.045 µg/L.
- 0.184 pounds of EDB removed (Jan 09 – June 09)
  - 0.18 pounds (97.7%) EDB removed by 69EW0001 (91% of system flow)
  - 0.004 pounds (2.3%) EDB removed by 69EW0002 (9% of system flow)
- Well Performance
- 69EW0001 operated at 91% of design flow of 500 gpm
- 69EW0002 operated at 94% of design flow of 50 gpm



Data Source: AFCEE, September 2009, MMR-AFCEE Data Warehouse

#### Legend

- ◆ 69EW0001
- 69PLT01023 (Shallow Wellpoint Combined Influent)
- 69EW0002
- MMCL = 0.02  $\mu\text{g/L}$

#### FIGURE 12

#### FS-28 REMEDIAL SYSTEM INFLUENT EDB CONCENTRATION TRENDS

AFCEE - Massachusetts Military Reservation  
16 September 2009 Technical Update Meeting

# FS-28 Triennial SPEIM Data Presentation

## Conclusions

- Groundwater monitoring data show a continued decline in EDB concentrations in the main body of the FS-28 EDB plume resulting in an updated depiction of the FS-28 plume boundary (Figure 4).
- Maximum detected EDB concentration in main body of the plume now 1.33 µg/L (declining from 2.54 µg/L in April 2007 and 2.89 µg/L in April 2006).
- Monitoring data at 69MW1303 cluster continue to indicate plume capture by 69EW0001.
- Monitoring data indicate continued downgradient migration and attenuation of the deep leading edge plume lobe and overall decline in EDB concentrations.
- No EDB MMCL exceedances detected in wells selected to monitor shallow leading edge plume lobe; therefore shallow lobe no longer depicted.
- No EDB detected in surface water samples collected in May, July, and September\* 2009; therefore no cranberry sampling expected in 2009

\* Data unvalidated

# FS-28 Triennial SPEIM Data Presentation

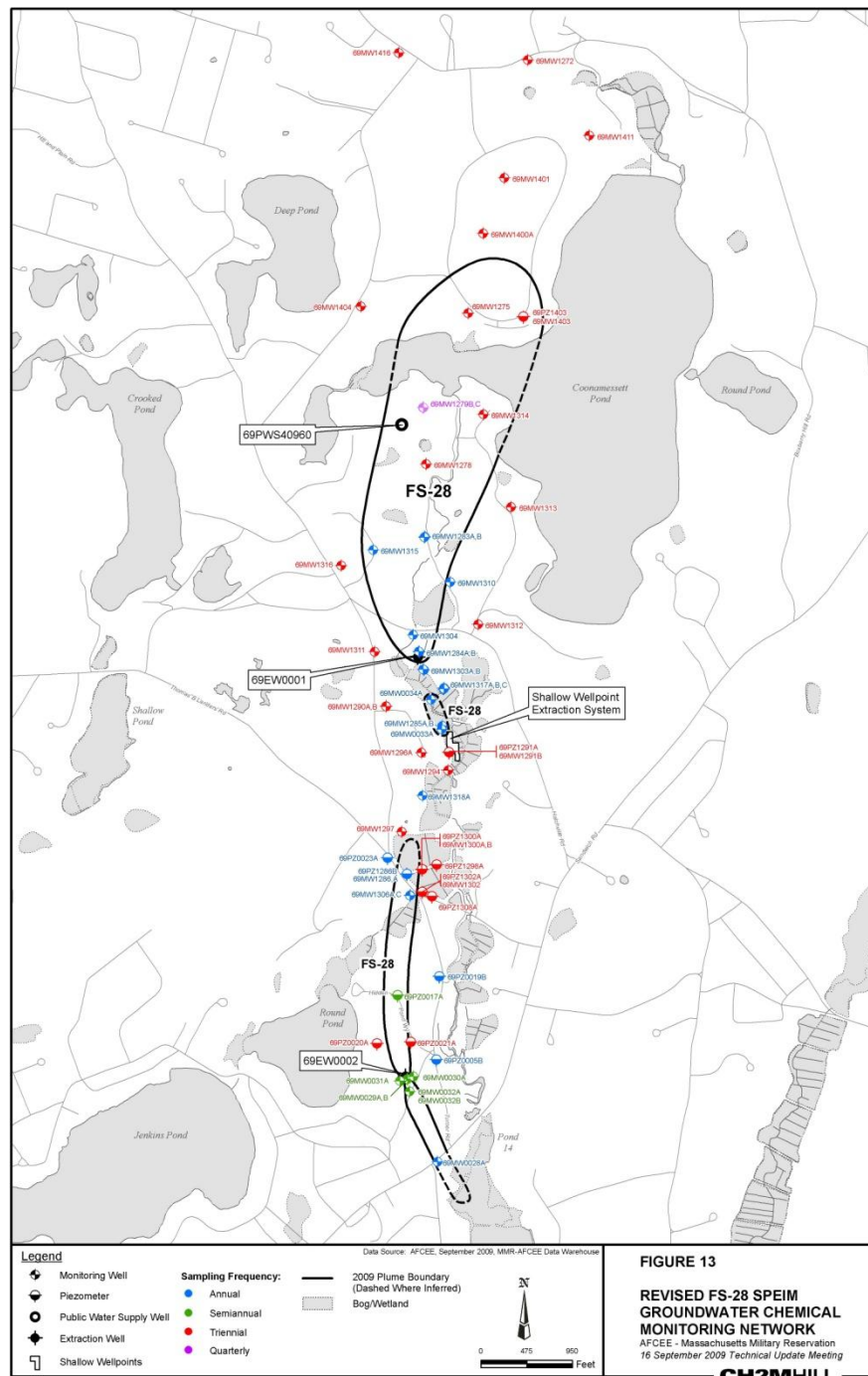
## Conclusions (cont.)

- SWP system is no longer effective at remediating the remnants of the EDB plume and system should be permanently shutdown; two wells (69MW0033A and 69MW0034A) to be added to SPEIM network to monitor attenuation of remaining plume in this area.
- Based on one round of post-optimization sampling at 69EW0001, packering of this extraction well appears to have improved mass removal efficiency.
- Data support conclusion that remedial goals of the system are being met; and plume cleanup is progressing as expected.

## Recommendations

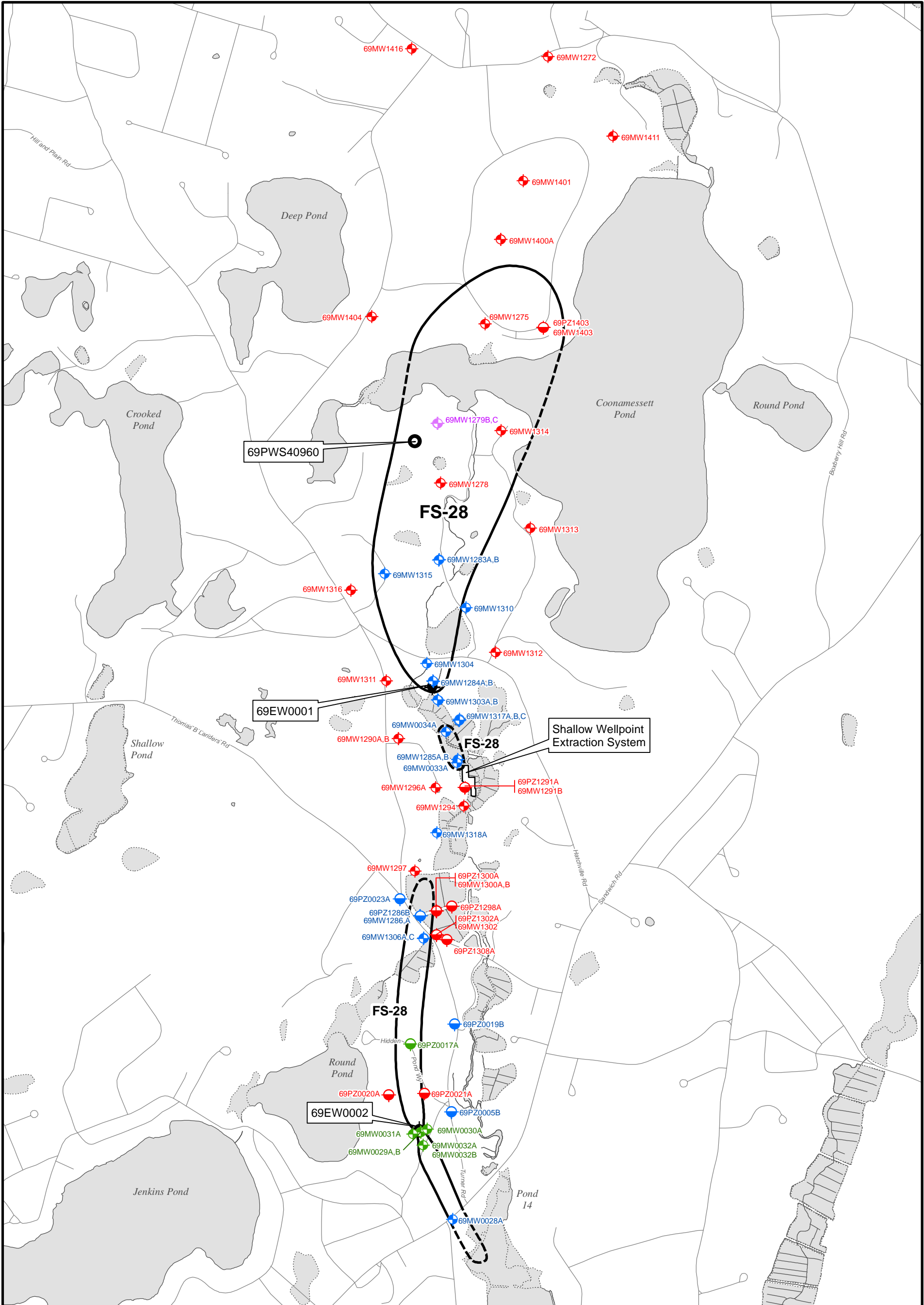
- Update FS-28 plume boundary as depicted on Figure 13
- Permanently shutdown the SWP system and add wells 69MW0033A and 69MW0034A to SPEIM chemical network for annual monitoring for EDB
- AFCEE will continue with all planned SPEIM activities including:
  - Perform semiannual sampling (August 2009) and annual sampling (January 2010)
  - Continue quarterly Coonamessett Water Supply Well sentry well sampling program
  - Perform routine monthly remedial system performance monitoring.
  - Present sampling results at late Winter 2010 Technical Update meeting.







## **ATTACHMENT B**



Data Source: AFCEE, September 2009, MMR-AFCEE Data Warehouse

FIGURE B-1

**FS-28 SPEIM GROUNDWATER  
CHEMICAL MONITORING NETWORK**  
AFCEE - Massachusetts Military Reservation  
FS-28 2009 Triennial Data Presentation Project Note

**Table B-1**  
**FS-28 SPEIM Chemical Monitoring Network**  
**FS-28 2009 Triennial Data Presentation Project Note**


Location	Monitoring Rationale	Frequency	Parameters
<b>Groundwater Monitoring Network</b>			
69MW0028A	Monitor the leading edge of the deep plume lobe near Sandwich Road	A	EDB
69MW0029A	Performance monitoring for 69EW0002	SA	EDB
69MW0029B	Performance monitoring for 69EW0002	SA	EDB
69MW0030A	Performance monitoring for 69EW0002	SA	EDB
69MW0031A	Performance monitoring for 69EW0002	SA	EDB
69MW0032A	Performance monitoring for 69EW0002	SA	EDB
69MW0032B	Performance monitoring for 69EW0002	SA	EDB
69MW0033A	Monitor between 69EW0001 and SWPs	A	EDB
69MW0034A	Monitor between 69EW0001 and SWPs	A	EDB
69MW1272	Monitor the trailing edge of northern part of the main EDB plume	TE	EDB
69MW1275	Monitor the northern part of the main EDB plume	TE	EDB
69MW1278	Monitor the plume between Coonamessett Pond and Hatchville Road	TE	EDB
69MW1279B	CWSW sentry wells	Q	EDB
69MW1279C	CWSW sentry wells	Q	EDB
69MW1283A	Monitor the plume between Coonamessett Pond and Hatchville Road	A	EDB
69MW1283B	Monitor the plume between Coonamessett Pond and Hatchville Road	A	EDB
69MW1284A	Monitor the plume upgradient of 69EW0001	A	EDB
69MW1284B	Monitor the plume upgradient of 69EW0001	A	EDB
69MW1285A	Monitor between 69EW0001 and SWPs	A	EDB
69MW1285B	Monitor between 69EW0001 and SWPs	A	EDB
69MW1286	Monitor deep leading edge plume lobe (deep boundary)	A	EDB
69MW1286A	Monitor deep leading edge plume lobe (core)	A	EDB
69MW1290A	Monitoring to support capture of western side of main EDB plume by 69EW0001.	TE	EDB
69MW1290B	Monitoring to support capture of western side of main EDB plume by 69EW0001.	TE	EDB
69MW1291B	Monitor the trailing edge of the deep leading edge plume lobe	TE	EDB
69MW1294	Monitor the plume downgradient of shallow well points	TE	EDB
69MW1296A	Monitor northern boundary of deep leading edge plume lobe	TE	EDB
69MW1297	Monitor western plume boundary of leading edge deep plume lobe	TE	EDB
69MW1300A	Monitor leading edge lobes	TE	EDB
69MW1300B	Monitor leading edge lobes	TE	EDB
69MW1302	Monitor leading edge lobes	TE	EDB
69MW1303A	Monitor the plume downgradient of 69EW0001	A	EDB
69MW1303B	Monitor the plume downgradient of 69EW0001	A	EDB
69MW1304	Monitor the plume upgradient of 69EW0001	A	EDB
69MW1306A	Monitor core of leading edge deep plume lobe	A	EDB
69MW1306C	Monitor core of leading edge deep plume lobe	A	EDB
69MW1310	Monitor plume between the western arm of Coonamessett Pond and Hatchville Road	A	EDB
69MW1311	Monitor western plume boundary near the treatment plant	TE	EDB
69MW1312	Monitoring eastern plume boundary near Hatchville Road	TE	EDB
69MW1313	Monitor eastern plume boundary near between Coonamessett Pond and Hatchville Road	TE	EDB
69MW1314	Monitor eastern plume boundary north of Hatchville Road	TE	EDB
69MW1315	Monitor western plume boundary north of Hatchville Road	A	EDB
69MW1316	Monitor western plume boundary north of Hatchville Road	TE	EDB
69MW1317A	Monitor the plume downgradient of 69EW0001 and upgradient of shallow wellpoint	A	EDB
69MW1317B	Monitor the plume downgradient of 69EW0001 and upgradient of shallow wellpoint extraction wells	A	EDB
69MW1317C	Monitor the plume downgradient of 69EW0001 and upgradient of shallow wellpoint extraction wells	A	EDB
69MW1318A	Monitor northern portion of the uncaptured southern portion of the plume	A	EDB
69MW1400A	Monitor the northern part of the plume	TE	EDB
69MW1401	Monitor the northern part of the plume	TE	EDB
69MW1403	Monitor the northern part of the plume	TE	EDB
69MW1404	Monitor the north western boundary of the plume	TE	EDB
69MW1411	Monitor the trailing edge of northern part of the main EDB plume	TE	EDB
69MW1416	Monitor the trailing edge of northern part of the main EDB plume	TE	EDB
69PZ0005B	Monitor shallow leading edge plume lobe	A	EDB
69PZ0017A	Monitor core of leading edge deep plume lobe	SA	EDB


**Table B-1**  
**FS-28 SPEIM Chemical Monitoring Network**  
**FS-28 2009 Triennial Data Presentation Project Note**

Location	Monitoring Rationale	Frequency	Parameters
69PZ0019B	Monitor shallow leading edge plume lobe	A	EDB
69PZ0020A	Monitor boundary of deep leading edge plume lobe upgradient of 69EW0002	TE	EDB
69PZ0021A	Monitor boundary of deep leading edge plume lobe upgradient of 69EW0002	TE	EDB
69PZ0023A	Monitor deep leading edge plume lobe (western boundary)	A	EDB
69PZ1286B	Monitor deep leading edge plume lobe (upper boundary)	A	EDB
69PZ1291A	Monitor the plume in the vicinity of the SWPs	TE	EDB
69PZ1298A	Monitor shallow leading edge plume lobe	TE	EDB
69PZ1300A	Monitor shallow leading edge plume lobe	TE	EDB
69PZ1302A	Monitor shallow leading edge plume lobe	TE	EDB
69PZ1308A	Monitor shallow leading edge plume lobe	TE	EDB
69PZ1403	Monitor shallower portion of northern plume	TE	EDB
SWP <sup>1</sup>	Define footprint of plume discharge zone	As Needed <sup>1</sup>	EDB
<b>Surface Water Monitoring Network</b>			
69SW0006	Monitor surface water flowing into the upper Baptiste Bog	3x	EDB
69SW0010	Monitor surface water downstream of Bubbler #1	3x	EDB
69SW0019	Monitor surface water in the Coonamessett River adjacent to the shallow wellpoint extraction system	3x	EDB
69SW0046	Monitor surface water flowing out of the Adams bog	3x	EDB
69SW0048	Monitor surface water flowing out of the East Thompson bog	3x	EDB
69SW0049	Monitor surface water flowing south of Sandwich Road	3x	EDB
69SW0051	Monitor surface water flowing out of the Reservoir bog	A	EDB
69SW0052	Monitor surface water flowing out of the Middle bogs	A	EDB
69SW0060	Monitor surface water flowing out of the Augusta bog	3x	EDB
69SW0527	Monitor surface water flowing out of the Pond 14	3x	EDB
69SW2001	Monitor surface water flowing out into the Augusta bog	3x	EDB
69SW2002	Monitor surface water flowing into the West Thompson bog	3x	EDB
69SW2005	Monitor surface water flowing out of the LaSalle bog	3x	EDB
69SW2007	Monitor surface water flowing out of the Chaston bog	3x	EDB
69SW2009	Monitor surface water flowing out of the Lower bog	A	EDB

Note:  
1. Individual shallow wellpoints will be sampled as needed based on operation configuration of remedial system and to support performance evaluations.


Key:  
3x = 3 times during growing season (April - October)  
A = annually  
BE = biennially  
CWSW = Coonamessett Water Supply Well  
EDB = ethylene dibromide  
Q = quarterly  
SA = semiannually  
SWP = shallow wellpoint

  <b>AFCEE</b> <b>SPEIM/LTM/O&amp;M</b> <b>Otis ANG Base, Massachusetts</b> <b>AFCEE 4P08 FA8903-08-D8769-0148</b>	<b>PROJECT NOTE</b>		TASK ORDER 0148
			PROJECT NO. 389849
	<b>DOCUMENT CONTROL NUMBER:</b> <b>389849-SPEIM-FS28-PRJNOT-002</b>  <b>CDRL A001I</b>		PAGE 1 OF 4

Confirmation Of: <input checked="" type="checkbox"/> Meeting <input type="checkbox"/> Change Notice <input type="checkbox"/> General Project Note	Date Held: 09 December 2009 Location: Large IRP Conference Room Date Issued: 25 February 2010 Recorded By: Nigel Tindall
Subject:  <b>COONAMESSETT WATER SUPPLY WELL (CWSW)</b> <b>SENTRY WELL SAMPLING OPTIMIZATION</b>	Issued By: Patricia de Groot   <hr/> CH2M HILL PROGRAM MANAGER


ITEM	REMARKS
<b>1.0</b>	<p><b>INTRODUCTION AND BACKGROUND</b></p> <p>This project note summarizes an optimization evaluation of the Coonamessett Water Supply Well (CWSW) sentry well monitoring program conducted by the Air Force Center for Engineering and the Environment (AFCEE) at the Massachusetts Military Reservation (MMR). AFCEE has monitored groundwater at two sentry wells located near the Town of Falmouth's CWSW since 1996. The objective of this sentry well monitoring program was to assess whether groundwater contamination associated with the Fuel Spill-28 (FS-28) could potentially be a risk to the water quality of the CWSW (AFCEE 2000). It should be noted that in 1996 AFCEE did install a granular activated carbon treatment system at the CWSW as a precaution, even though monitoring data indicated that this water supply well had never been affected by the FS-28 plume. Continued operation of the CWSW wellhead treatment system was a part of the selected remedy for the FS-28 plume as described in the FS-28 Record of Decision (AFCEE 2000). However, this wellhead treatment system was subsequently dismantled in 2004 when water from the CWSW was connected to the Town of Falmouth's Crooked Pond treatment facility (AFCEE 2008).</p> <p>The FS-28 plume is defined as the extent of groundwater contaminated with the contaminant of concern (COC) ethylene dibromide (EDB) at concentrations exceeding the Massachusetts Maximum Contaminant Level (MMCL) of 0.02 micrograms per liter (µg/L). The FS-28 EDB plume is being remediated through the operation of the FS-28 extraction, treatment, and discharge (ETD) system. AFCEE established the System Performance and Ecological Impact Monitoring (SPEIM) program to monitor plume changes and evaluate the effectiveness of the MMR remedial systems. Further details of the FS-28 plume and the remedial activities completed by AFCEE to date are available in the <i>Final 3<sup>rd</sup> Five-Year Review, 2002-2007 MMR Superfund Site, Otis Air National Guard Base, MA</i> (AFCEE 2008) and the <i>FS-28 2008 Summary Letter Report</i> (AFCEE 2009), as well as on the AFCEE MMR Installation Restoration Program website at <a href="http://www.mmr.org">www.mmr.org</a>, under "Primary Site Documents."</p> <p>The results of the sentry well sampling program optimization were presented to the regulatory agencies during the 09 December 2009 Technical Update meeting at the MMR. The handout for the presentation, including text slides, two figures, and one table, is included as Attachment A.</p>

Distribution: AFCEE: Jon Davis, Mike Minor, Rose Forbes, Bob Power, Admin. Record; EPA: Paul Marchessault; Bob Lim; MassDEP: Len Pinaud, Elliot Jacobs; CH2M HILL: Pat de Groot, Nigel Tindall, Doc. Control

	<b>PROJECT NOTE</b>	TASK ORDER 0148
		PROJECT NO. 389849
<b>AFCEE</b> <b>SPEIM/LTM/O&amp;M</b> Otis ANG Base, Massachusetts AFCEE 4P08 FA8903-08-D8769-0148	<b>DOCUMENT CONTROL NUMBER:</b> <b>389849-SPEIM-FS28-PRJNOT-002</b>  <b>CDRL A001I</b>	PAGE 2 OF 4

ITEM	REMARKS
<b>2.0</b>	<p><b>SUMMARY OF OPTIMIZATION EVALUATION RESULTS</b></p> <p>Historically, the CWSW monitoring program consisted of monthly sampling of the Town of Falmouth's water supply well (69PWS40960) and two sentry monitoring wells (69MW1279B and 69MW1279C) for EDB analysis. The sentry wells are located approximately 350 feet northeast of the CWSW (Figure 1 in Attachment A). The CWSW is screened from approximately 50- to 60-feet below ground surface (elevation -13 to -23 feet mean sea level [ft msl]); the shallower of the two sentry monitoring wells (69MW1279B) is screened approximately 45 feet below the CWSW screen (-58 to -63 ft msl); and the deeper sentry well (69MW1279C) is screened approximately 100 feet below the CWSW screen (-103 to -108 ft msl). Based on the FS-28 conceptual site model, the upper boundary of the EDB plume in this area is located below the deeper of the two sentry wells.</p> <p><b>History of Sampling at the CWSW</b></p> <p>The CWSW was sampled by AFCEE monthly between November 1996 and February 2005 for EDB analysis. EDB was not detected in any of the samples collected during these 104 sampling events over this period. AFCEE discontinued sampling of the CWSW in February 2005 when the water from this well began to be conveyed to the Town of Falmouth's Crooked Pond treatment facility. Since February 2005, the water from the CWSW and Crooked Pond WSW are combined for treatment prior to distribution in the Falmouth municipal water system. This combined influent continues to be monitored for EDB, using method 504.1, by the Town of Falmouth quarterly.</p> <p><b>History of Sampling at the CWSW Sentry Wells</b></p> <p>The two CWSW sentry wells were monitored for EDB monthly between May 1997 and July 2005; then quarterly from July 2005 to present. EDB has been detected during three of the 117 sampling events at the shallow sentry well (69MW1279B). The three times EDB was detected (May 1997, February 2000, and March 2000), concentrations were below the analytical reporting limit of 0.01 µg/L; EDB has not been detected at this well since April 2000 (Table 1 in Attachment A).</p> <p>EDB has been consistently detected at the deeper of the sentry wells (69MW1279C); EDB was detected during 108 of the 116 sampling events. However, EDB was only detected above the MMCL on one occasion at 0.021 µg/L in April 2000 (Table 1 in Attachment A). In addition, EDB concentrations at this well have shown a consistent decreasing trend since April 2000 (Figure 2 in Attachment A) and are currently at concentration below the reporting limit of 0.01 µg/L.</p> <p>The monitoring data collected at the CWSW and the two sentry wells support the FS-28 conceptual site model that the upper boundary of the FS-28 EDB plume is located deeper in the aquifer than the deepest of the two sentry wells and over 100 feet below the bottom of the CWSW screen.</p>



	<b>PROJECT NOTE</b>	TASK ORDER 0148
		PROJECT NO. 389849
AFCEE SPEIM/LTM/O&M Otis ANG Base, Massachusetts AFCEE 4P08 FA8903-08-D8769-0148	DOCUMENT CONTROL NUMBER: 389849-SPEIM-FS28-PRJNOT-002  CDRL A001I	PAGE 3 OF 4

ITEM	REMARKS
<b>3.0</b>	<b>CONCLUSIONS/RECOMMENDATIONS</b>  <b>Conclusions</b>  Based on a review of the data collected by AFCEE under the CWSW monitoring program and the FS-28 SPEIM program, the following can be concluded: <ul style="list-style-type: none"> <li>• The long history of sampling data collected at the CWSW and sentry wells provide evidence that the FS-28 EDB plume is not impacting the water quality within the zone of contribution to the CWSW (69PWS4096).</li> <li>• The SPEIM and CWSW monitoring data support the FS-28 conceptual site model in that the upper boundary of the FS-28 plume near and upgradient of the CWSW is more than 100 feet below the wellscreen of the CWSW.</li> <li>• EDB concentrations in the FS-28 plume in the area below the CWSW are not expected to increase in the future, nor is the plume expected to be detected shallower in the aquifer.</li> <li>• Appropriate sentry well monitoring for the CWSW can be accomplished by sampling the deeper sentry well, 69MW1279C, only.</li> </ul> <b>Recommendations</b>  Recommendations are as follows: <ul style="list-style-type: none"> <li>• Reduce the sampling frequency at sentry well 69MW1279C from quarterly to annual. The next scheduled sampling event at 69MW1279C for EDB monitoring would be October 2010.</li> <li>• Discontinue monitoring at 69MW1279B.</li> </ul>
<b>4.0</b>	<b>REGULATOR COMMENTS/ACTION ITEMS</b>  No comments or concerns were received from USEPA on the information presented at the 09 December 2009 Technical Update meeting. MassDEP requested time to consult with their Drinking Water Program staff on the proposed optimization; on 24 February 2010, MassDEP concurred with the optimization as outlined in this project note.
<b>5.0</b>	<b>REFERENCES</b>  AFCEE (Air Force Center for Engineering and the Environment). 2009 (March). <i>Fuel Spill-28 2008 Summary Letter Report</i> . 371335-SPEIM-FS-28-SLR-001. Prepared by CH2M HILL for AFCEE/MMR, Installation Restoration Program, Otis Air National Guard Base, MA.

# PROJECT NOTE

TASK ORDER  
0148

PROJECT NO.  
389849

AFCEE  
SPEIM/LTM/O&M  
Otis ANG Base, Massachusetts  
AFCEE 4P08 FA8903-08-D8769-0148

DOCUMENT CONTROL NUMBER:  
389849-SPEIM-FS28-PRJNOT-002  
CDRL A001I

PAGE 4 OF 4

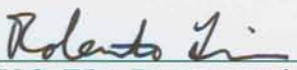
ITEM	REMARKS
------	---------


\_\_\_\_\_. 2008 (September). *Final 3<sup>rd</sup> Five-Year Review, 2002-2007 MMR Superfund Site, Otis Air National Guard Base, MA.* Prepared by Portage Environmental, Engineering Strategies Corporation, and CH2M HILL for AFCEE/MMR, Installation Restoration Program, Otis Air National Guard Base, MA.

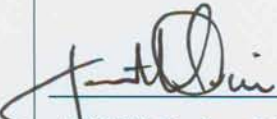
\_\_\_\_\_. 2000 (October). *Final Record of Decision for the Fuel Spill-28 and Fuel Spill-29 Plumes.* AFC-J23-35Q86101-M26-0009. Prepared by Jacobs Engineering Group for AFCEE/MMR, Installation Restoration Program, Otis Air National Guard Base, MA.

## 6.0 CONCURRENCE

Concurrence with the revisions to the CWSW sentry well monitoring program presented in this project note is represented by the signatures below:

 2/24/10  
U.S. EPA Representative

 2/24/2010  
MassDEP Representative

 2/24/10  
AFCEE Project Manager

Note: The parties involved will retain the ability to modify monitoring program based on field observations or other mutually agreeable technical justifications.

### Attachment:

Attachment A. Coonamessett Water Supply Well (CWSW) Sentry Well Sampling Optimization, 09 December 2009 Technical Update Meeting



## **ATTACHMENT A**

# **Coonamessett Water Supply Well (CWSW)**

## **Sentry Well Sampling Optimization**

### **09 December 2009 Technical Update Meeting**

- Well Location (Figure 1) and Construction Information
  - CWSW - 69PWS40960 (screen elevation: -13 to -23 ft msl)
  - Shallow Sentry Well - 69MW1279B (screen elevation: -58 to -63 ft msl)
  - Deep Sentry Well - 69MW1279C (screen elevation: -103 to -108 ft msl)
- EDB Sampling History for CWSW (69PWS40960)
  - Monthly from November 1996 through February 2005
  - Frequency of EDB Detections: No detections in 104 sampling events
  - Combined influent from CWSW and Crooked Pond Well sampled quarterly for EDB analysis by Town of Falmouth at Crooked Pond Treatment Facility
- EDB Sampling History for CWSW Sentry Wells
  - Monthly from May 1997 through July 2005
  - Quarterly from July 2005 to October 2009
  - Frequency of EDB Detections (Table 1):
    - » 69MW1279B 3 BRL detections in 117 times sampled; ND since April 2000
    - » 69MW1279C 108 detections in 116 times sampled; one MMCL exceedance (0.021 µg/L in April 2004) – Refer to Figure 2 for EDB Concentration Trend
- 69MW1279C screened near upper boundary of FS-28 plume

# Coonamessett Water Supply Well (CWSW)

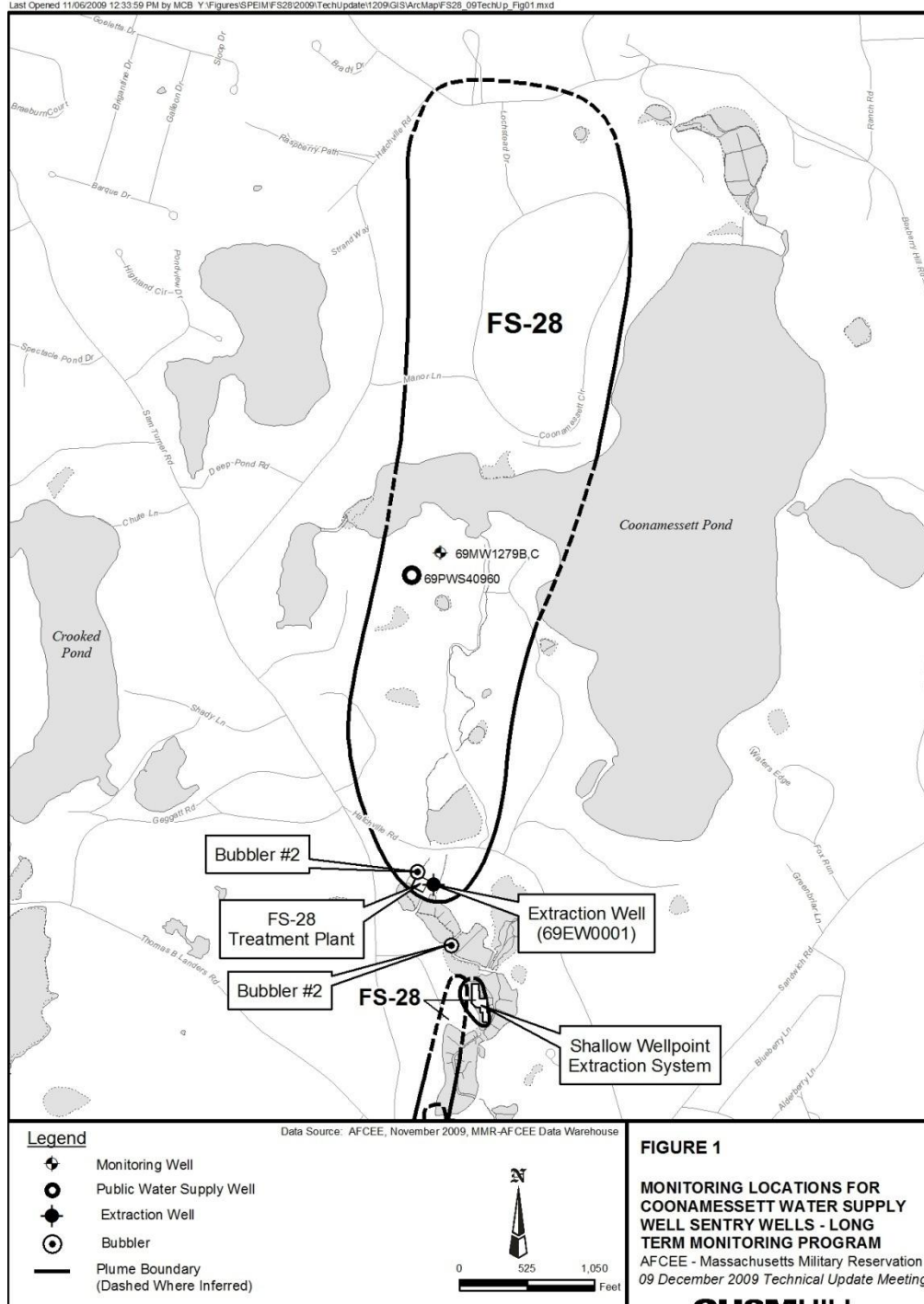
## Sentry Well Sampling Optimization

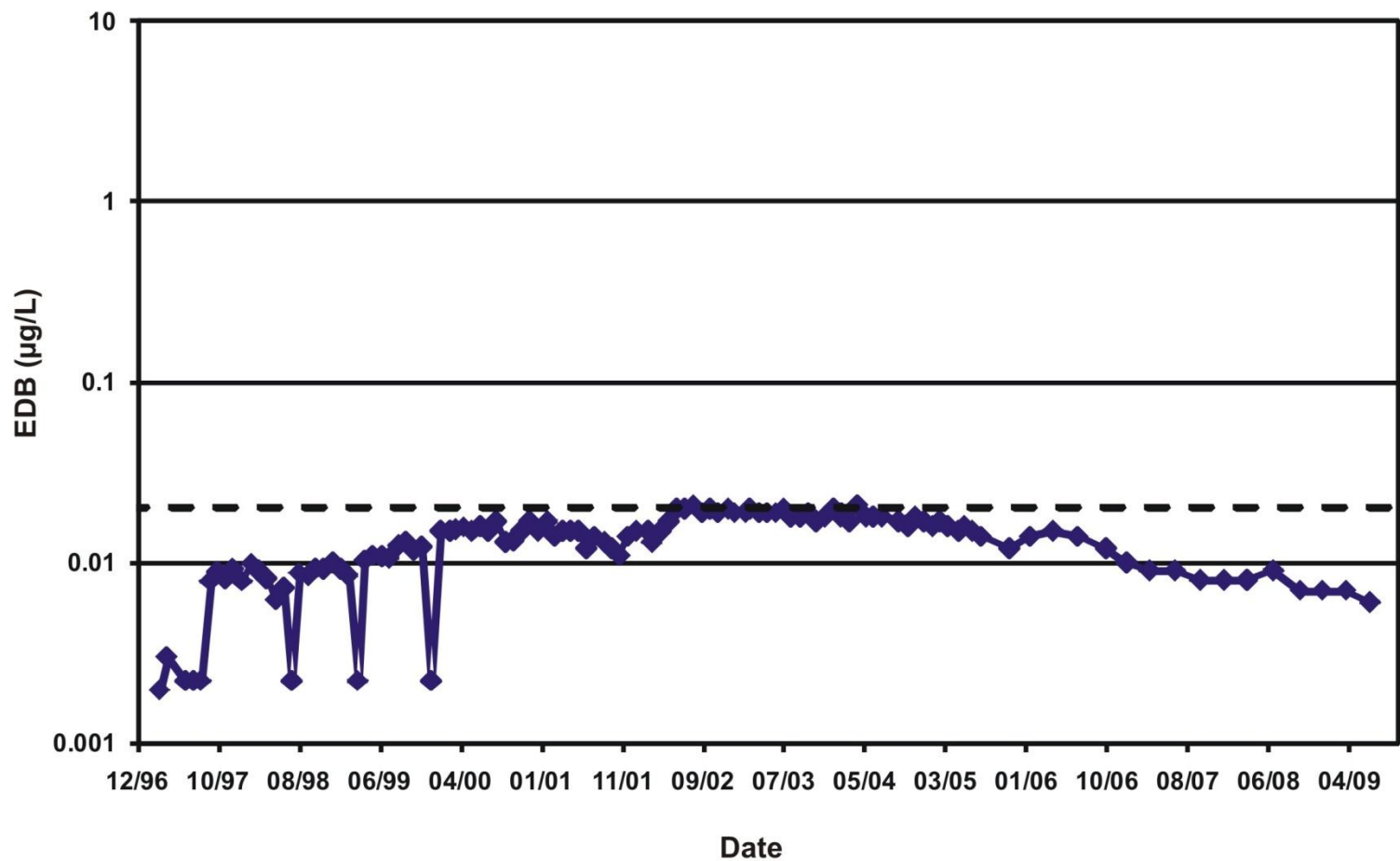
### Conclusions

- The long history of sampling data collected at the CWSW and sentry wells provide evidence that the FS-28 EDB plume is not impacting the water quality within the zone of contribution to CWSW 69PWS40960
- Based on monitoring data collected under the SPEIM program, the upper boundary of the FS-28 plume near and upgradient of the CWSW is collapsing deeper in the aquifer
- EDB concentrations in the FS-28 plume below the CWSW are not expected to increase in the future, nor is the plume expected to be detected shallower in the aquifer
- Appropriate sentry well monitoring for the CWSW can be accomplished by sampling sentry well 69MW1279C only

### Recommendations

- Reduce the sampling frequency at sentry well 69MW1279C from quarterly to annual. The next sampling event would be October 2010
- Discontinue sampling at 69MW1279B





Legend

- ◆ 69MW1279C (-105.5 ft msl)  
(CWSW Sentry Well)
- MMCL (0.02 µg/L)

Data Source: AFCEE, November 2009, MMR-AFCEE Data Warehouse

**FIGURE 2**

**EDB CONCENTRATION TREND AT  
CWSW SENTRY WELL 69MW1279C**

AFCEE - Massachusetts Military Reservation  
09 December 2009 Technical Update Meeting

**Table 1**  
**Laboratory Results for EDB Analysis**  
**Coonamessett Water Supply Well Sentry Well Sampling Optimization**  
**09 December 2009 Technical Update Meeting**

Location	Date	Sample ID	Test	Analyte	Result	RL	Units
69MW1279B	3/7/1997	69MW1279B-01	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	5/14/1997	69MW1279B-02B	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.01	µg/L
69MW1279B	6/18/1997	69MW1279B-03	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	7/16/1997	69MW1279B-04	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	8/13/1997	69MW1279B-05	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	9/16/1997	69MW1279B-06	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	10/15/1997	69MW1279B-07	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	11/12/1997	69MW1279B-08	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	12/9/1997	69MW1279B-09	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	1/13/1998	69MW1279B-10	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	2/17/1998	69MW1279B-11	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	3/17/1998	69MW1279B-12	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	4/15/1998	69MW1279B-13	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	5/19/1998	69MW1279B-14	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	6/17/1998	69MW1279B-15	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	7/15/1998	69MW1279B-16	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	8/12/1998	69MW1279B-17	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	9/17/1998	69MW1279B-18	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	10/14/1998	69MW1279B-19	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	11/11/1998	69MW1279B-20	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	12/15/1998	69MW1279B-21	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	1/13/1999	69MW1279B-22	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	2/10/1999	69MW1279B-23	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	3/18/1999	69MW1279B-24	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	4/14/1999	69MW1279B-25	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	5/13/1999	69MW1279B-26	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	6/17/1999	69MW1279B-27	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	7/13/1999	69MW1279B-36	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	8/17/1999	69MW1279B-37	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	9/15/1999	69MW1279B-37	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	10/14/1999	69MW1279B-38	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	11/12/1999	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	12/16/1999	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	1/19/2000	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	2/25/2000	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.01	µg/L
69MW1279B	3/17/2000	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.01	µg/L
69MW1279B	4/14/2000	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	5/15/2000	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	6/16/2000	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	7/14/2000	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	8/15/2000	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	9/18/2000	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	10/17/2000	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L

**Table 1**  
**Laboratory Results for EDB Analysis**  
**Coonamessett Water Supply Well Sentry Well Sampling Optimization**  
**09 December 2009 Technical Update Meeting**

Location	Date	Sample ID	Test	Analyte	Result	RL	Units
69MW1279B	11/15/2000	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	12/15/2000	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	1/16/2001	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	2/20/2001	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	3/20/2001	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	4/18/2001	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	5/15/2001	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	6/15/2001	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	7/16/2001	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	8/15/2001	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	9/20/2001	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	10/15/2001	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	11/15/2001	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	12/14/2001	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	1/15/2002	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	2/27/2002	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	3/15/2002	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	4/17/2002	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	5/15/2002	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	6/14/2002	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	7/15/2002	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	8/15/2002	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	9/17/2002	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	10/15/2002	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	11/15/2002	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	12/23/2002	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	1/16/2003	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	2/25/2003	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	3/14/2003	69MW1279B-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	4/16/2003	CHPM00001-M0403	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	5/15/2003	CHPM00001-M0503	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	6/17/2003	CHPM00001-M0603	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	7/17/2003	CHPM00001-M0703	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	8/14/2003	CHPM00001-M0803	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	9/16/2003	CHPM00001-M0903	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	10/14/2003	CHPM00001-M1003	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	11/14/2003	CHPM00001-M1103	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	12/16/2003	CHPM00001-M1203	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	1/19/2004	CHPM00001-M0104	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	2/13/2004	CHPM00001-M0204	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	2/17/2004	CHPM00001-M0204	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	3/15/2004	CHPM00001-M0304	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	4/15/2004	CHPM00002-M0404	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L

**Table 1**  
**Laboratory Results for EDB Analysis**  
**Coonamessett Water Supply Well Sentry Well Sampling Optimization**  
**09 December 2009 Technical Update Meeting**

Location	Date	Sample ID	Test	Analyte	Result	RL	Units
69MW1279B	5/18/2004	CHPM00001-M0504	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	6/15/2004	CHPM00001-M0604	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	7/16/2004	CHPM00001-M0704	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	8/17/2004	CHPM00001-M0804	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	9/15/2004	CHPM00001-M0904	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	10/21/2004	CHPM00001-M1004	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	11/16/2004	CHPM00001-M1104	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	12/17/2004	CHPM00001-M1204	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	1/19/2005	CHPM00001-M0105	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	2/15/2005	CHPM00001-M0205	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	3/16/2005	CHPM00001-M0305	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	4/25/2005	CHPM00001-M0405	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	5/17/2005	CHPM00001-M0505	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	6/16/2005	CHPM00001-M0605	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	7/19/2005	CHPM00001-M0705	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	10/31/2005	CHPM00001-M0805	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	1/17/2006	CHPM00001-Q0106	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	4/12/2006	CHPM00011-Q0206	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	7/13/2006	CHPM00078-M0706	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	10/24/2006	CHPM00078-Q0406	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	1/9/2007	CHPM00078-Q0107	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	4/5/2007	CHPM00078-Q0207	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	7/9/2007	CHPM00078-Q0307	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	10/10/2007	CHPM00078-Q0407	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	1/7/2008	CHPM0079B-Q0108	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	4/2/2008	CHPM0079B-Q0208	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	7/7/2008	CHPM0079B-Q0308	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	10/15/2008	CHPM0079B-Q0408DIF	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	1/6/2009	CHPM0079B-Q0109DIF	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	4/3/2009	CHPM0079B-Q0209DIF	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	7/1/2009	69MW1279B-GW-070109	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279B	10/2/2009	69MW1279B-WG-100209-DIF	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND*	0.01	µg/L
69MW1279C	3/13/1997	69MW1279C-01	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279C	4/9/1997	69MW1279C-02	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279C	6/18/1997	69MW1279C-03	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279C	7/16/1997	69MW1279C-04	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279C	8/13/1997	69MW1279C-05	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279C	9/16/1997	69MW1279C-06	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.01	µg/L
69MW1279C	10/15/1997	69MW1279C-07	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.01	µg/L
69MW1279C	11/12/1997	69MW1279C-08	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.01	µg/L
69MW1279C	12/9/1997	69MW1279C-09	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.01	µg/L
69MW1279C	1/13/1998	69MW1279C-10	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.01	µg/L
69MW1279C	2/17/1998	69MW1279C-11	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.01	µg/L



**Table 1**  
**Laboratory Results for EDB Analysis**  
**Coonamessett Water Supply Well Sentry Well Sampling Optimization**  
**09 December 2009 Technical Update Meeting**

Location	Date	Sample ID	Test	Analyte	Result	RL	Units
69MW1279C	3/17/1998	69MW1279C-12	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.01	µg/L
69MW1279C	4/15/1998	69MW1279C-13	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.01	µg/L
69MW1279C	5/19/1998	69MW1279C-14	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.01	µg/L
69MW1279C	6/17/1998	69MW1279C-15	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.01	µg/L
69MW1279C	7/15/1998	69MW1279C-16	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279C	8/12/1998	69MW1279C-17	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.01	µg/L
69MW1279C	9/17/1998	69MW1279C-18	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.01	µg/L
69MW1279C	10/14/1998	69MW1279C-19	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.01	µg/L
69MW1279C	11/11/1998	69MW1279C-20	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.01	µg/L
69MW1279C	12/15/1998	69MW1279C-21	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.010	0.01	µg/L
69MW1279C	1/13/1999	69MW1279C-22	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.01	µg/L
69MW1279C	2/10/1999	69MW1279C-23	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.01	µg/L
69MW1279C	3/18/1999	69MW1279C-24	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279C	4/14/1999	69MW1279C-25	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.010	0.01	µg/L
69MW1279C	5/13/1999	69MW1279C-26	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.011	0.01	µg/L
69MW1279C	6/17/1999	69MW1279C-27	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.011	0.01	µg/L
69MW1279C	7/13/1999	69MW1279C-36	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.011	0.01	µg/L
69MW1279C	8/17/1999	69MW1279C-37	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.013	0.01	µg/L
69MW1279C	9/15/1999	69MW1279C-37	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.013	0.01	µg/L
69MW1279C	10/14/1999	69MW1279C-38	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.012	0.01	µg/L
69MW1279C	11/12/1999	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.012	0.01	µg/L
69MW1279C	12/16/1999	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND	0.01	µg/L
69MW1279C	1/19/2000	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.015	0.01	µg/L
69MW1279C	2/25/2000	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.015	0.01	µg/L
69MW1279C	3/17/2000	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.015	0.01	µg/L
69MW1279C	4/14/2000	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.016	0.01	µg/L
69MW1279C	5/15/2000	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.015	0.01	µg/L
69MW1279C	6/16/2000	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.016	0.01	µg/L
69MW1279C	7/14/2000	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.015	0.01	µg/L
69MW1279C	8/15/2000	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.017	0.01	µg/L
69MW1279C	9/18/2000	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.013	0.01	µg/L
69MW1279C	10/17/2000	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.013	0.01	µg/L
69MW1279C	11/15/2000	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.015	0.01	µg/L
69MW1279C	12/15/2000	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.017	0.01	µg/L
69MW1279C	1/16/2001	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.015	0.01	µg/L
69MW1279C	2/20/2001	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.017	0.01	µg/L
69MW1279C	3/20/2001	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.014	0.01	µg/L
69MW1279C	4/18/2001	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.015	0.01	µg/L
69MW1279C	5/15/2001	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.015	0.01	µg/L
69MW1279C	6/15/2001	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.015	0.01	µg/L
69MW1279C	7/16/2001	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.012	0.01	µg/L
69MW1279C	8/15/2001	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.014	0.01	µg/L
69MW1279C	9/20/2001	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.013	0.01	µg/L

**Table 1**  
**Laboratory Results for EDB Analysis**  
**Coonamessett Water Supply Well Sentry Well Sampling Optimization**  
**09 December 2009 Technical Update Meeting**

Location	Date	Sample ID	Test	Analyte	Result	RL	Units
69MW1279C	10/15/2001	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.012	0.01	µg/L
69MW1279C	11/15/2001	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.011	0.01	µg/L
69MW1279C	12/14/2001	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.014	0.01	µg/L
69MW1279C	1/15/2002	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.015	0.01	µg/L
69MW1279C	2/27/2002	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.015	0.01	µg/L
69MW1279C	3/15/2002	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.013	0.01	µg/L
69MW1279C	4/17/2002	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.015	0.01	µg/L
69MW1279C	5/15/2002	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.017	0.01	µg/L
69MW1279C	6/14/2002	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.020	0.01	µg/L
69MW1279C	7/15/2002	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.020	0.01	µg/L
69MW1279C	8/15/2002	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.021	0.01	µg/L
69MW1279C	9/17/2002	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.019	0.01	µg/L
69MW1279C	10/15/2002	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.020	0.01	µg/L
69MW1279C	11/15/2002	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.019	0.01	µg/L
69MW1279C	12/23/2002	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.020	0.01	µg/L
69MW1279C	1/16/2003	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.019	0.01	µg/L
69MW1279C	2/25/2003	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.019	0.01	µg/L
69MW1279C	3/14/2003	69MW1279C-	E504	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.020	0.01	µg/L
69MW1279C	4/16/2003	CHPM00002-M0403	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.019	0.01	µg/L
69MW1279C	5/15/2003	CHPM00002-M0503	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.019	0.01	µg/L
69MW1279C	6/17/2003	CHPM00002-M0603	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.019	0.01	µg/L
69MW1279C	7/17/2003	CHPM00002-M0703	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.020	0.01	µg/L
69MW1279C	8/14/2003	CHPM00002-M0803	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.018	0.01	µg/L
69MW1279C	9/16/2003	CHPM00002-M0903	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.018	0.01	µg/L
69MW1279C	10/14/2003	CHPM00002-M1003	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.019	0.01	µg/L
69MW1279C	11/14/2003	CHPM00002-M1103	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.017	0.01	µg/L
69MW1279C	12/16/2003	CHPM00002-M1203	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.018	0.01	µg/L
69MW1279C	1/19/2004	CHPM00002-M0104	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.020	0.01	µg/L
69MW1279C	2/13/2004	CHPM00002-M0204	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.018	0.01	µg/L
69MW1279C	2/17/2004	CHPM00002-M0204	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.019	0.01	µg/L
69MW1279C	3/15/2004	CHPM00002-M0304	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.017	0.01	µg/L
69MW1279C	4/15/2004	CHPM00003-M0404	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	<b>0.021</b>	0.01	µg/L
69MW1279C	5/18/2004	CHPM00002-M0504	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.018	0.01	µg/L
69MW1279C	6/15/2004	CHPM00002-M0604	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.018	0.01	µg/L
69MW1279C	7/16/2004	CHPM00002-M0704	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.018	0.01	µg/L
69MW1279C	9/15/2004	CHPM00002-M0904	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.017	0.01	µg/L
69MW1279C	10/21/2004	CHPM00002-M1004	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.016	0.01	µg/L
69MW1279C	11/16/2004	CHPM00002-M1104	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.018	0.01	µg/L
69MW1279C	12/17/2004	CHPM00002-M1204	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.017	0.01	µg/L
69MW1279C	1/19/2005	CHPM00002-M0105	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.016	0.01	µg/L
69MW1279C	2/15/2005	CHPM00002-M0205	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.017	0.01	µg/L
69MW1279C	3/16/2005	CHPM00002-M0305	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.016	0.01	µg/L
69MW1279C	4/25/2005	CHPM00002-M0405	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.015	0.01	µg/L

**Table 1**  
**Laboratory Results for EDB Analysis**  
**Coonamessett Water Supply Well Sentry Well Sampling Optimization**  
**09 December 2009 Technical Update Meeting**

Location	Date	Sample ID	Test	Analyte	Result	RL	Units
69MW1279C	5/17/2005	CHPM00002-M0505	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.016	0.01	µg/L
69MW1279C	6/16/2005	CHPM00002-M0605	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.015	0.01	µg/L
69MW1279C	7/19/2005	CHPM00002-M0705	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.014	0.01	µg/L
69MW1279C	10/31/2005	CHPM00002-M0805	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.012	0.01	µg/L
69MW1279C	1/17/2006	CHPM00002-Q0106	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.014	0.01	µg/L
69MW1279C	4/12/2006	CHPM00012-Q0206	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.015	0.01	µg/L
69MW1279C	7/13/2006	CHPM00079-M0706	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.014	0.01	µg/L
69MW1279C	10/24/2006	CHPM00079-Q0406	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.012	0.01	µg/L
69MW1279C	1/9/2007	CHPM00079-Q0107	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	0.010	0.01	µg/L
69MW1279C	4/5/2007	CHPM00079-Q0207	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.01	µg/L
69MW1279C	7/9/2007	CHPM00079-Q0307	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.01	µg/L
69MW1279C	10/10/2007	CHPM00079-Q0407	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.01	µg/L
69MW1279C	1/7/2008	CHPM0079C-Q0108	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.01	µg/L
69MW1279C	4/2/2008	CHPM0079C-Q0208	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.01	µg/L
69MW1279C	7/7/2008	CHPM0079C-Q0308	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.01	µg/L
69MW1279C	10/15/2008	CHPM0079C-Q0408DIF	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.01	µg/L
69MW1279C	1/6/2009	CHPM0079C-Q0109DIF	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.01	µg/L
69MW1279C	4/3/2009	CHPM0079C-Q0209DIF	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.01	µg/L
69MW1279C	7/1/2009	69MW1279C-GW-070109	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	BRL	0.01	µg/L
69MW1279C	10/2/2009	69MW1279C-WG-100209-DIF	E504.1	1,2-DIBROMOETHANE (ETHYLENE DIBROMIDE)	ND*	0.01	µg/L

Data Source: AFCEE, November 2009, MMR-AFCEE Data Warehouse

Note: **BOLD** text represents concentration above EDB Massachusetts Maximum Contaminant Level (MMCL) of 0.02 µg/L

Key:

BRL = below reporting limit

ND = nondetect

ND\* = nondetect - data reported to RL of 0.01 µg/L.

RL = reporting limit

µg/L = micrograms per liter